MARINE REVIEW

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ROCKEFELLER VS. CARNEGIE.

How does it happen that representatives of John D. Rockefeller and Andrew Carnegie on the great lakes are engaged in a struggle over freights? Was it not understood, only a few years ago, that Rockefeller and Carnegie had entered into long-term contracts whereby Rockefeller was to be the carrier of the ore and Carnegie the consumer? These questions have been asked repeatedly during the past few days. A brief summary of the relations between these two great interests will explain the situation. A few years ago Rockefeller had ore mines, a railroad in Minnesota and a fleet of ships but was not in any way and is not now a consumer of ore. Carnegie was a great consumer of ore but had no mines and no transportation facilities on the lakes. Through the efforts of Henry W. Oliver of Pittsburg, who was himself interested in the development of ore properties, certain big mines in Minnesota (notably the Mountain Iron owned by Rockefeller) were leased to Carnegie (or rather to the Oliver Mining Co., which is controlled by Carnegie and his associates) for fifty years at a fixed royalty and with a stipulated minimum production of ore. In making this lease it was understood that all ore from the leased property, amounting now to about 1,400,000 tons annually, should be carried over the Rockefeller railroad to Duluth and in Rockefeller ships for ten years to Ohio ports. The railroad freight and mining royalty were fixed for a term of years, but the lake freight was to be agreed upon each year, or if no agreement could be reached on this score a settlement was to be made at the end of the year, based on the average rate at which the ore of all other companies was moved. There was not minimum or maximum figure in the lake freight feature of the transaction, and this is therefore the one main reason why Rockefeller's representatives, claiming a share of the big profits that are being made in iron and steel, were determined to fix the rate for next season at $1.25 a ton, as against the even dollar figure which the Carnegie company set out to establish.

HENRY W. OLIVER.

But it must not be understood that the interests of either Rockefeller or Carnegie in lake ores are confined to the one item of about a million and a half tons carried by the contracts above referred to. Rockefeller has ore to sell—great quantities of it—to Carnegie's competitors, and Carnegie has bought or leased through the Oliver company, since the first deal with Rockefeller, a dozen or more big mines that have brought his production up to about four and a half million tons, as against the million and a half on which he is tied up with Rockefeller. Rockefeller has gone on building more ships and has bought the whaleback fleet of thirty vessels for marketing his own ore as well as for the transportation of Carnegie ore. Carnegie with about three million tons of ore to transport independent of his contract with Rockefeller, turns to building and buying ships, as the other big steel organizations are so provided and as that is the weak link in his system. But Carnegie is as yet "short" on ships, to use a stock exchange phraze. He cannot get them within a year and probably not enough then. On the other hand, Rockefeller's interests are heaviest in ships. He is not pleased to see Carnegie going into the vessel business, and he is not only using the power of his own big fleet (fifty-seven steel vessels) but has cornered the market by the charter of full 1,500,000 tons additional capacity for next season, so as to make up in a freight of $1.25 a ton what he lost at 62½ cents a ton this season.

Of course it is the representatives of Carnegie and Rockefeller and not particularly the men themselves that are referred to in the foregoing paragraphs. Henry W. Oliver, representing the Carnegie mining interests, spent several days lately with Edwin S. Mills of the Carnegie branch office in Cleveland while these lake freight negotiations were going on, and L. M. Bowers, the Cleveland representative of Mr. Rockefeller, was undoubtedly coached by F. T. Gates of New York, a first lieutenant of the Standard Oil leader.

Some ill feeling must necessarily exist in important business struggles of this kind, but after all it would seem that the end will be an amalgamation of the two interests. Otherwise, conditions may arise to force Rockefeller into the manufacture of iron and steel. Rockefeller has in his mines, railroad and ships what the Carnegie company wants to secure beyond all question its position as the foremost industrial organization of the world. It is said that Rockefeller's entire holdings in the lake region were offered to the Carnegie company some time ago at $50,000,000, but that figure would probably not buy the property now, in view of the general rise of values that has taken place in these lines.

An order was recently placed with Yarrow of England by the Japanese government for four high-speed torpedo boats. In one of them all of the auxiliary machinery will be driven by electrical power.

TWENTY-FIVE NEW STEEL SHIPS.

A COMPLETE SUMMARY OF ORDERS IN SHIP YARDS OF THE GREAT LAKES SHOWS THAT VESSELS TO COME OUT IN 1900 ARE VALUED AT $7,637,000—ALL BUT ONE ARE FREIGHTERS—THEY WILL CARRY THREE MILLION GROSS TONS IN A FULL SEASON.

At prices now prevailing for vessel property on the great lakes the value of twenty-five steel vessels under contract with the American Ship Building Co. and three independent yards, is $7,637,000. An estimate made a short time ago referred only to vessels being built by the consolidated ship yards and the total value was based on contract prices. These twenty-five vessels, with one exception, are freight carriers and all are to come out in 1900. A couple of steamers to be completed this fall—one at Detroit and the other at Toledo—are not included. Neither does the list include wooden vessels, although James Davidson of West Bay City, Mich., has one very large wooden vessel on the stocks and will probably build two more to come out in 1900. Of the twenty-four steel freighters only four are tow barges. In a single trip this fleet will carry 150,200 gross tons and in a full season just about 3,000,000 gross tons, but its capacity for 1900 will probably not reach much more than half the latter figure, on account of delays that will be encountered in the ship yard. Some of the vessels will not be out until very late next fall. The list follows:

	Approximate value at present prices.	Estimated capacity, gross tons, in one trip.
BUILDING BY AMERICAN SHIP BUILDING CO. FOR:		
A. B. Wolvin and American Steel & Wire interests, four 500-foot steamers	$1,550,000	32,000
A. B. Wolvin and others, two Welland canal size steamers	345,000	6,000
Carnegie-Oliver steel interest, six steamers	2,280,000	44,500
Bessemer Steamship Co., one steamer and two tow barges	775,000	21,000
Eddy Bros. of West Bay City, two steamers	680,000	12,100
John Mitchell of Cleveland, one steamer	350,000	6,100
Minnesota Steamship Co., two tow barges	450,000	14,400
Robert R. Rhodes, Cleveland, one Welland canal size steamer	172,000	3,000
Detroit & St. Clair river excursion company, a passenger steamer	300,000	.....
BUILDING BY UNION DRY DOCK CO. OF BUFFALO FOR:		
Lehigh Valley Trans Co., one package freighter	395,000	5,100
BUILDING BY CRAIG SHIP BUILDING CO. OF TOLEDO FOR:		
Arthur Hawgood and others of Cleveland, one Welland canal size steamer	170,000	3,000
BUILDING BY JENKS SHIP BUILDING CO. OF PORT HURON FOR:		
Account of sale, one Welland canal size steamer	170,000	3,000
	$7,637,000	150,200

The steamer to be built for the Lehigh Valley Transportation Co. by the Union Dry Dock Co. of Buffalo (not in the consolidation) is the latest order in the above list. This steamer will be a package freighter, in nearly all respects similar to the Buffalo, completed only a short time ago by the same builders for the New York Central line of steamers running between Chicago and Buffalo, and which is by long odds the finest package freighter on the lakes. It is understood that this new Lehigh Valley steamer will cost about $400,000. Engines and boilers will be built by the American Ship Building Co., as the Union Dry Dock Co. has no engine works. Manager Gaskin of the Buffalo ship yard could probably have had a contract long ago for a vessel of the ordinary coarse freight kind, but it would pay him to hold off for an order like that which he now has in hand, on account of the heavy expenditure involved in such a steamer.

There is no secret now about negotiations that have been under way in Detroit for the construction of two side-wheel freight and passenger steamers of great power to run between Detroit and Buffalo. The Detroit & Cleveland Navigation Co. is back of the project, and it has been expected every day for two weeks past that the contract would be signed, but for some reason, probably Michigan Central Railway influence, the matter still hangs fire. The main features of plans for the boats have been agreed upon. They will be capable of making 22 statute miles an hour in regular service and will be very much larger than the Cleveland & Buffalo line steamers; in fact there will be nothing to surpass them in all America. The Detroit & Cleveland company will undoubtedly go on with the establishment of this new line—if not now, certainly a little later on—as the management was confronted only a short time ago with the danger of a new company entering the passenger service on Lake Erie by building just such boats for the Detroit and Buffalo route as are now proposed.

The Craig Ship Building Co. of Toledo is to have a works for the construction of engines. The shop, 160 by 75 feet, is already under way and some of the tools have been purchased. A number of heavy tools will be provided for work aside from marine lines that may be secured in and around Toledo. The Craig company now has a berth idle in its ship yard, and if they do not secure a contract for another boat shortly will undoubtedly put one down on their own account.

LEGISLATION FOR OUR MERCHANT MARINE.

Questions Submitted by the Marine Review.

1. Shall the United States continue to allow its merchant marine in foreign trade to fight a losing battle until it entirely passes out of existence and foreign nations absorb the ocean carrying of our entire import and export trade?

2. Shall the United States decide, as its permanent nonpartisan public policy, that an equitable share of its imports and exports must be carried on vessels of the United States, built in our own ship yards and flying our own flag, and that congress will enact whatever national legislation may be needed to stimulate and encourage our citizens to create, maintain and operate the vessels this policy calls for?

3. If it is recommended that congress shall enact remedial legislation what shall it be, and why?

FROM GEN. HENDERSON, NEXT SPEAKER OF THE HOUSE.

I have not as yet had many or very extended talks with representatives on the subject of legislation at the next session of congress, but I think it is the general opinion that something will be done for the upbuilding of our merchant marine in the foreign trade, as indeed something assuredly ought to be done. The Republican platform in my own state has declared for such action, and I have no doubt that had opportunities presented themselves numerous other states would have done likewise. Whether or not legislation in the interest of our foreign shipping can come up early in the session, I am not prepared to say, for the reason that I have no means of knowing definitely what other matters may claim precedence by reason of their importance.

FROM THE MANAGER OF THE CHICAGO SHIP BUILDING CO.

Editor Marine Review: From any patriotic American the answer to your first question is as obviously "no" as that to the second is "yes." Every consideration of national honor, security and prosperity requires those answers. Equally evident is it that national aid of some kind is required by our ship owners to enable them to compete with the foreigner, and the only question has been and is as to what form that aid shall take, whether indirectly by discriminating duties or directly by subsidies, bounties, mail pay or whatever it may be called. Up to a comparatively recent period I have been in favor of discriminating duties, but I am free to admit now that the difficulties in the way of the adoption of that policy are insuperable and that a straight out bounty plan, such as was presented in the Hanna-Payne bill before the last congress, is the only practicable remedy.

The great awakening of public sentiment in this country to the absolute necessity of a strong navy and of a merchant marine from which that navy may be recruited, both in ships and men, which has been one of the happiest results of the late war with Spain, in which our navy so covered itself with glory, gives every assurance now that such a policy will be adopted. What we have had to contend with hitherto has been the ignorance and indifference of the great mass of our people, who live inland, never even saw salt water, and have been unable to comprehend that this question was bound up with, not only the security of the nation itself, but their own lives and prosperity.

I regret, however, to see that some of your correspondents still harp on the old fallacy that it has been the cost of building ships here which has kept us out of the foreign trade. It is not the first cost, but the cost of operation that has been the obstacle, and all that our ship owners ask or need is help enough to equalize running expenses with the foreigner, and at no time during all the years that the free ship bill has been an incubus on the American ship builder would that bill, if passed, have helped the ship owner or the nation. Happily, however, there is no longer any danger in such a bill, for all our ship builders need now is plenty of work and time to get ready, and we can build cheaper than any nation on the face of the earth. W. I. BABCOCK.

Chicago, Oct. 14, 1899.

MAKE PROSPERITY PERMANENT, SAYS THOMAS CLYDE OF NEW YORK.

Editor Marine Review: This country is now enjoying a period of prosperity such as has never been approached, much less equalled, in its previous history. The vast stream of immigration that has for years been flowing into it, threatening to so overstock our labor markets as to seriously reduce the earning and hence the purchasing power of the American workingman, has been absorbed in the development of our natural resources, and the condition of our laboring classes is today more prosperous than ever before. This is also true of all other classes of our population. The farmer, the merchant and the manufacturer are alike all actively and profitably employed.

Unfortunately, however, as we know by experience, our producing power is in the long run greater than our consuming power, and we are always led, as prosperity continues, to increase production until it exceeds our power of consumption, and then commercial depression, with all its attendant losses and hardships, ensues. Many people are already trying to forsee the time when our present prosperity will thus prove self-destructive in order to prepare themselves for the hard times certain then to follow. Would it not be wiser, however, before accepting this collapse of our present prosperity as inevitable, to first devote our intelligence and energies to a careful search for some practicable method of avoiding or at least materially postponing such an outcome?

It will doubtless be readily conceded that if we can find abroad adequate markets to absorb our increasing surplus production, the problem will be solved. We are already selling our products, to a considerable extent, in most of the markets of the world, in competition with foreign rivals, and it has been the writer's experience that when two parties produce a given article at a like first cost, and once succeed in gaining a footing in the same market, the most potent factor in determining which shall survive and thrive there, is the relative cost of transportation, or in other words the relative rates of freight on said article from the respective points of its production to the market in question. The producer who gets the lowest rate of freight almost always wins. But assuming this theory to be correct, how can the producers of the United States obtain lower freight rates to foreign markets? Obviously the present steamship lines that carry our exports will not voluntarily reduce their rates. Let us suppose, however, that a line of American steamships is established from the United States to any foreign port where we are endeavoring to sell our goods. What would be the result? The new American line and the present foreign lines would inevitably and immediately begin to fight for the business. Rates would be rapidly reduced to a much lower level, and the American producers of export goods of all kinds would reap the benefit and have that advantage to help them in their struggle to undersell their foreign rivals. At first the American line so established would not be sufficient in capacity to carry a very large share of the business, which would still move mostly in foreign vessels, so that the foreign vessel owners would have to contribute in reduced rates upon the goods carried many thousands of dollars for the benefit of our exporters, and later on, the establishment of more American lines would gradually drive the foreigners out of the business, and our exporters would not only get the benefit of the reduced freight rates, but the country as a whole would also secure the almost incalculable benefits of having these freights paid to American citizens instead of to foreigners as at present, and these vast sums, which it is estimated now aggregate over $200,000,000 annually, would be kept in circulation here and so increase our consuming power at home instead of depleting that power by being constantly drained out of the country.

The methods and conditions that determine the success or failure of nations as competitors for the trade of the world, do not differ materially from those that determine the success or failure of rival industrial enterprises within the same nation. Let us assume that one of our great industrial companies is producing a commodity and that in order to successfully maintain and develop its business, it becomes necessary to sell some of this commodity in a home market in competition with a similar commodity produced by a rival home company, and that it finds the only existing railroad, or canal or steamship line, as the case may be, by which its commodity can be forwarded to the said market, is owned by the rival company and that consequently it cannot obtain reasonable rates or adequate facilities for the proper development of its business. What would the first industrial establishment do? Would it not immediately take steps by paralleling its rival or otherwise to procure, at any reasonable cost, as cheap and as good facilities for getting its commodity to market as those enjoyed by its rival? And why should we as a nation deal differently with the question of getting our surplus products to foreign markets as cheaply and promptly as our rivals? These foreign rivals now control practically all the available means of transportation. They give us such freight rates as they please and in many cases very inferior service, while their own products are being forwarded from their own ports by established lines which afford them the quickest despatch and best possible service. This nation can no more expect to successfully sell its surplus products in markets that can only be reached by the vessels of rival nations, than an industrial company could expect to successfully sell its goods in a market to which it had to ship over a line owned by a rival.

It is perhaps hardly necessary to add that the vessels used in the establishment and operation of American lines should be built in American ship yards. A proper development of this industry is absolutely essential to our national wellfare from every point of view. Our recently acquired prestige as a naval power cannot be otherwise maintained, and furthermore, the ship building industry affords more opportunities than any other one industry for the continuous and profitable employment of all classes of American labor, both skilled and unskilled, as well as for the profitable utilization of our exceptional natural resources in the production of the numerous materials that enter into ship construction.

If we desire to enjoy the benefits here referred to, which are to be derived from the establishment of an American-owned and American-built merchant marine for foreign trade, we must in some way overcome the disadvantages from which American vessel owners suffer by reason of the greater cost of American labor than of foreign labor. Shall we attempt to do this by lowering the scale of American wages? Far be it from the writer to suggest such a course. The contrast between the American wage scale and the foreign wage scale is perhaps the most striking proof of our national success, and should be most jealously guarded. But this obstacle to the establishment of an American merchant marine for foreign trade must be overcome nevertheless, and the only way in which it can be overcome without diminishing the earning power of American labor, is by direct and adequate government aid to American shipping.

Congress will shortly assemble to deal with all matters affecting our national wellfare, and it behooves every American citizen, and especially the American laboring man who desires to see our present prosperous condition continued and if possible made permanent, to give most careful thought to the questions that are necessarily somewhat hastily dealt with here, and to make it a point to see that his representative in congress clearly understands his views on the subject of the establishment of an American merchant marine for foreign trade by such measure of direct government aid as may be found necessary.

THOMAS CLYDE.

New York, Oct. 11, 1899.

NO DRY STATISTICS—AN APPEAL TO COMMON SENSE.

Editor Marine Review: If a foreign foe should invade our land how long would it be before the tread of armed hosts would be heard in every

state of the union; how long before the people as a unit would rise in their might and demand that our national congress pass without delay an act providing for all the men and money necessary to drive the invader back? Is there an American but will not answer "not a day?" Make it more personal! Suppose a robber breaks in your house to carry off or destroy property that you have labored long years to accumulate; would you hesitate to protect your property and defend your rights? Not a second. Suppose, again, that you had enjoyed a trade, and other merchants plant themselves alongside of you and with bigger stores and larger stock of goods attract the trade from you. What would you do? Would you move into a smaller shop; reduce your stock; cut off advertising; discharge your clerks? Not much, unless you wanted to die of dry rot.

You ask what has all this to do with the revival of our foreign shipping interest. Can you not see the parallel? Your country has been invaded, your house has been robbed, your trade has been taken away from you. Formerly the ships of England had only 10 per cent of the foreign trade and American ships enjoyed 90 per cent. Now England, France, Germany, and other foreign powers enjoy—yes, "enjoy" is the word—90 per cent, while we hold barely 10 per cent, and every year makes it worse. It was bad enough when the enemy had ships of only 2,500, 3,000, or, say 5,000 tons; but suspecting that we would come to our senses some time in the future they determined to make it as hard for us as possible, and they built the enormous Lucania, Campania, and later the gigantic Oceanic, and say more to follow. It is a good deal like the wholesaler saying: "Why trade at little retail shops when you can buy at our splendid and palatial establishment." Well, say you, what can we do about it? Do!—why do just what the United States did in 1776, repeated in 1812, and did over again in 1898. Rise in our gigantic strength and take back what has wrongfully been taken from us; say to the world: "This has been going on for thirty-eight years and has got to stop."

Here we are going to Europe every year by the thousand and sending our wheat, corn, oats, cotton, and manufactured goods to the other side by the hundreds of thousands of tons per annum and all the earnings going to foreigners—$200,000,000 or more a year paid by Americans—what for? Why, to help them build more ships to carry you and your goods, to establish foreign savings banks; to feed and clothe the people of Europe; to open shops in London, Liverpool, Berlin, Hamburg and Havre. Is it not about time we built some ships, thought about our own savings banks, fed and clothed our own people, and remembered that we had a New York, San Francisco, New Orleans, Chicago and other cities that had room for more stores? I hear some one say, "Yes, this is all true, but every one who discusses this subject deals in generalities; tell us just what to do in particular." Why, do just what England and other foreign nations have done to get the trade away from us—put up the cash. "Well, but"—there is always a "but" with a pessimist—"England has the advantage of us in lower wages, lower cost of maintenance," etc., etc. Has she? Well, notwithstanding this she finds it necessary to pay about $4,000,000 per year in subsidies and has found it a splendid investment, and other nations have found out the same thing. The argument that you use is all right, but you use it on the wrong side. Because England has these advantages is the very reason why we should do the same thing and more of it. If England can afford to do all this with her population and her little seacoast, what can we not afford to do with our 75,000,000 of people, a seacoast bordering on two oceans, and grain and cotton fields and manufactories enough between them to supply the world? Realize once and always that the money so expended is not lost or sunk; it is the best paying investment that the United States can make. It will speedily come back into the homes and pockets of every American man, woman, and child in the north, in the south, in the east and in the west—come back to the merchant and manufacturer and to our vast laboring population; come back to men of all political parties.

I deal not in dry statistics, but appeal to the common sense of the American people and ask that they rise en masse in their sovereign power and demand of congress the enactment of a law that will establish our flag on the high seas as firmly and as securely as it is established all over this vast domain that is our common heritage.

D. D. C. MINK.

Philadelphia, Pa.

STEAMER PORTO RICO.

The Craig Ship Building Co. of Toledo, O., has just launched its seventy-sixth vessel, the Porto Rico, building for Miller, Bull & Knowlton of New York city, for whom the Craigs recently built the steamer Mae. The new vessel, like her predecessor from the Toledo yard, will be employed in the Porto Rico service, although the boat now building will be employed almost exclusively in the coasting service around the island, distributing the passengers and freight brought from New York by the steamers Ponce and San Juan, which are also in the service of Miller, Bull & Knowlton. The Porto Rico is 220 feet in length, 32 feet beam, and 21 feet depth, while the Mae, first vessel built at Toledo for the New York firm, is 263 feet in length, 12 feet beam and 25 feet draught, being of 2,000 gross or 1,200 net tons burden. The Porto Rico will carry both passengers and freight, having accommodations for twenty-four first-class, thirty-six second-class and 150 steerage passengers. She is fitted with triple expansion engines that have cylinders of 18, 27 and 45 inches diameter and 30 inches stroke. Steam is supplied from two boilers, each 11 by 11½ feet, and capable of a working pressure of 175 pounds. It is estimated that the Porto Rico will maintain a speed of 15 knots. She will leave for the coast via the St. Lawrence route in a short time but she will not shoot the rapids as did the Mae, as it is expected she will make use of the recently completed Soulanges canal. The Porto Rico was launched with engines and boilers in place.

The first payment upon the large floating dry dock under construction by the Maryland Steel Co. at Sparrow's Point, Md., for the United States government will be made this month. Rear Admiral Endicott, chief of the bureau of yards and docks, has expressed himself as well pleased with the outlook for the speedy construction of this dock. It is the intention of the department and the builders to endeavor to make a record, not only for efficiency but for rapidity of construction.

STABILITY OF THE NEW ORLEANS.

The question of the stability of the cruiser New Orleans, the only foreign-built vessel of her type in the United States navy, does not seem to have been settled as yet, by any means. The naval board of inspection and survey has ordered that the work of repairs on the vessel at the Brooklyn navy yard be hurried as much as possible. When the New Orleans comes out of dry dock a test will be made as to her stability. It is claimed that on the trip from Hampton Roads, a couple of weeks ago, she rolled heavily in an ordinary sea, while the manner in which she rolled on her recent trip from San Domingo is claimed to be further evidence of her top-heaviness. The Armstrongs of England, builders of the New Orleans and also of the Albany—the latter a sister vessel of the New Orleans and now under construction at their yard—have protested against the statements made derogatory to the New Orleans. In a letter to an American correspondent the English firm says:

"We have looked for some time for a contradiction of the obviously untrue statements which have been published, but no such contradiction has appeared. We should be sorry to think that the reports in question had been published with the intention of unfairly misrepresenting our work and unfairly prejudicing us in the eyes of other nations. We can not suppose that this is the case. The vessel in question (the New Orleans) was not, it is true, built in consultation with the United States technical officers. She and the Albany were purchased from the Brazilian government in an emergency with our concurrence, but not at our wish, and we venture to think it should be remembered that while the New Orleans admittedly rendered great service during the late war, we are at the present time finishing the Albany for the United States government without receiving any increase in price, four years after entering into a contract for her construction for the Brazilian government, and the cost of the material and labor have been increased about 20 per cent, whereby we have been the losers in a considerable sum. It is trusted, therefore, that some way may be seen to remove the erroneous impression that the paragraphs to which we have referred must have caused."

In another private letter the firm says: "It is not our custom to take notice of vague reports that appear in newspapers, especially in cases when, as in the present, we have had from your own lips, statements so directly contrary, and speaking so highly of the efficiency of the New Orleans, but we should feel greatly indebted if you would take any steps which may seem to you desirable to remove the impression which these reports may have made upon officers in the service of the United States."

A report has also been received at the navy department from the Armstrongs which gives their side of the case. It furnishes voluminous data of an inclining test made with the Albany. The ship was in the condition described as "well advanced toward completion" when the experiments were made, and a mean metacentric height of about 32 inches was obtained. From this metacentric height other conditions were calculated, giving the results as follows: Under condition one, ship battery and outfit complete, and no water in boilers, no crew, ammunition stores, water or coal on board, displacement, 2,695 tons; mean draught, 14 feet 1 inch; the metacentric height of 1.22 feet or 14.6 inches was obtained. Under a second condition, which may be described as light cruising condition, with ship battery and outfit, crew and water and machinery complete; ammunition stores, coal and water half consumed; displacement of the ship, 3,402 tons; mean draught, 16 feet 9 inches; metacentric height would be 2.38 feet, or over 28½ inches. Under a third condition, the most favorable, with ship battery and outfit, crew and water and machinery complete; all ammunition stores, coal and water on board; displacement, 3,954 tons; mean draught, 18 feet 9 inches; the metacentric height obtained from this condition was 2.69 feet, or over 32 inches.

NEW YACHT FOR THE LAKES.

A very handsome steam yacht has just been added to the great lake fleet in the Winyah. The vessel was formerly the Dungeness and was until recently owned by Mrs. Andrew Carnegie of Pittsburg. Her new owners are Allen Fletcher of Alpena, Mich., and Frank W. Fletcher of Detroit. The vessel sailed from New York Sept. 16 and has just arrived at Detroit. At Montreal the old crew was replaced by a crew of lake seamen. The yacht is 120 feet over all, 100 feet at the water line and has 20 feet breadth of beam. She carries a Scotch boiler 10½ by 10½ feet, and is allowed 125 pounds of steam. Her engines are of the fore-and-aft compound type with cylinders of 13 and 26 inches diameter and 18 inches stroke. They develop about 300 horse power. There is a "donkey" boiler for emergencies and for water pumps, ventilation and heating. This yacht, built in 1894 at a cost of about $80,000, is entirely of steel.

The Dungeness was not built for speed, but was designed for comfort and sea strength. Her passenger quarters are forward and designed in such a manner that every inch of space is utilized. The main saloon above decks is finished in mahogany, handsomely carved and lighted by fourteen capacious windows protected in stormy weather with sea shutters, and containing a heavy glass plate section. From the saloon a double winding stairway leads to the cabin below, where is a comfortable dining room and smoking room, one large double state room, three private state rooms, and back of the cabin a commodious state room designed especially for the comfort of the former owner of the vessel, Mrs. Carnegie. The cabin has a large bath room, with hot and cold water. The sideboard is an especially designed affair of cut plate, and the pantry and linen rooms are complete in equipment. The lower cabin is in white with carved decorations. The crew's quarters aft comprise private rooms for the engineer and mate, and sleeping quarters for the sailors. The kitchen is unusually large for craft of the kind. The cooler for meats will accommodate 1,000 pounds of ice and supplies for a long cruise.

Another trial of the Holland submarine torpedo boat was made a few days ago at Greenport, N. Y. The boat was navigated for two miles submerged, coming up for five seconds at the end of the first mile for observations. At the end of the second mile, while coming to the surface, the regulation Whitehead torpedo, identical with that in use on war vessels, was fired at a target. The shot was perfect, the torpedo keeping on its course directly in line with the target for 600 yards. After firing the torpedo, the boat changed her course, making almost a complete circle and at the same time diving until completely submerged.

LAKE LEVELS—PROPOSED DAM IN THE NIAGARA.

BY GEORGE Y. WISNER,

MEMBER OF U. S. BOARD ON DEEP WATERWAYS.*

A general idea of the climatic and physical conditions of the drainage basin of the great lakes, which are the cause of the annual and periodic fluctuations of the water surfaces, is essential to a correct understanding of the effect which these changes of lake levels have upon the connecting waterways, and the amount which the extreme fluctuations may be modified without injury to the vested rights of property holders. These conditions will, therefore, be briefly discussed with the view of tracing the relations between the natural causes and the resulting variations in the stage of the lake levels, and of showing the limits within which a remedy may be safely applied.

The modern business man takes great pride in the working of the clearing houses of the country, by means of which a single dollar is made to enter into the settlement of a large number of liabilities without passing from the control of its holder. Nature also has its clearing house, by means of which each drop of water evaporated from the surface of the ocean is precipitated and collected on the watersheds of the lakes and rivers, to be returned through our waterways to its original source, thus maintaining the surface of the ocean at a fixed level, and, incidentally, without charge for country collections. The winds which sweep across the oceans and lakes, picking up moisture to be precipitated for the supply of vegetation and of water courses, are by no means constant for successive years, and, while the general result so far as the whole earth is concerned is a perpetual routine, the volume transported to any given drainage basin has a wide variation from year to year.

The average annual rainfall on the Lake Superior basin is 28 inches, and varies, so far as known, between the minimum limit of 20 inches and a maximum of 34 inches. Lakes Michigan and Huron have an average precipitation of 32.5 inches, which varies on different years between 27 inches and 40 inches. On the Lake Erie basin, the average rainfall is 36 inches, and for different years varies between 28 inches and 41 inches, from which it will be seen that the amount of water distributed over the entire lake basin may vary upwards of 50 per cent on years of maximum and minimum supply.

The volume of precipitation falling directly upon the surfaces of the lakes is entirely supply, while of that falling upon the watershed tributary to the lakes, a certain portion is absorbed into the earth for supply to subterranean water courses, to appear elsewhere as artesian springs; a part is taken up by vegetation and evaporated, to be again redistributed as rainfall, and the balance finds its way through the swamps, creeks and rivers into the main reservoirs of the lake system. The percentage of the water falling on the watershed which eventually flows into the lakes as supply depends upon the topographical and physical features of the country, and has a wide variation. The clearing up of forests and converting of the land into tile drained farms have greatly modified the volume of flow, and the time required for the run-off from watershed to reach the lake reservoirs. In the original condition of the lake region, the water which was months in working its way through swamps and obstructed water courses, under improved conditions may not be as many days in reaching the lakes, a condition tending to increase the rapidity of a rise from any given rainfall on the watershed. The amount of water which the ground of any given locality is capable of absorbing and evaporating, from its vegetation, and from the surfaces of swamps and ponds, is practically constant for different years, provided the supply is adequate and sufficiently regular, and, since the volume of rainfall for some years is not much in excess of that needed for vegetation, the run-off for dry years is very small, and for wet years very large, making the total supply to the lakes for different years have a much greater variation than the volumes of rainfall from which derived.

The total supply to the lakes is eventually either discharged at the outlets or evaporated from the surfaces. The amount of annual evaporation from the lakes varies with the condition of the atmosphere, and winds, being greater during dry than during wet seasons, while the volume of discharge at the outlets of the lakes depends largely on the stage of the water in the lakes, the outflow increasing rapidly with the rise of the lake levels.

The areas of the surfaces of Lakes Michigan and Huron are so great that one foot in depth corresponds to a supply of 40,300 cubic feet per second for an entire year, or 484,000 cubic feet per second for one month, and, since the level of the lakes falls at times at the rate of 0.66 feet per month, or 320,000 cubic feet per second (when the discharge at outlet is only 190,000 cubic feet per second), the corresponding evaporation must be at least 130,000 cubic feet per second in excess of actual supply.

The regulation of the level of any lake implies that the surface must be maintained at or near some fixed stage, to accomplish which the discharge must be so controlled that it will be at all times approximately equal to the difference between the supply of water to the lake and the evaporation from the lake surface. It has been shown, however, that the evaporation from the surfaces of Lakes Huron and Michigan is at times largely in excess of the supply, and, therefore, it is practically impossible to regulate the levels of those lakes. If actual supply is a negative quantity the level must fall even within any discharge at outlet. It has been found from recent investigations that the fluctuations of those lakes may be decreased, however, about 25 per cent by backwater from Lakes St. Clair and Erie, by the regulation of the latter lake, without interfering with the volume of storage necessary for the maintenance of the proper volume of flow through the connecting waterways during dry periods.

Recent examinations have shown that the bed of the St. Clair river in the rapids just below the outlet of Lake Huron has deepened from erosion about 18 feet since 1886, and that the level of Lakes Michigan and Huron has been permanently lowered about one foot by the lower slope needed through the increased area of outlet. To raise the present low water level of the lake one foot would practically restore the limit of the low stage existing previous to 1886.

From a careful study of the levels of Lakes Huron, St. Clair and Erie, and of the slopes of the connecting rivers for different volumes of flow, it appears that for any given amount that the low water stage of Lake Erie may be raised that for Lake St. Clair will be raised two-thirds as much, and the low stage for Lake Huron one-third of the increase of elevation given to Lake Erie. In other words, if the level of Lake Erie should be raised 3 feet the 3-feet fall now existing in the Detroit river would be wiped out, and the level of Lake St. Clair would rise until the necessary slope was established to produce the same volume of flow as previous to making the improvement. Since the area of the river cross-section would be increased by the greater depth obtained, the resulting necessary slope would be reduced to about 2 feet, making the low stage at the Flats 2 feet higher than under present conditions. For similar reasons, the low water stage of Lakes Huron and Michigan would be raised one foot.

Under present conditions, the slope of the waterway from Lake Huron to Lake Erie decreases slightly as the lakes rise, but with the level of Lake Erie maintained at a fixed stage, the slope would vary with the stage of water in Lake Huron, and consequently the discharge would become a function of the elevation of water at the outlet of the lake, a condition requisite for taking care of a maximum variation of supply to the lake reservoirs with a minimum fluctuation of the lake surfaces. The surface of Lake Superior has a mean fluctuation of 1.2 feet and a maximum change of level of 3.5 feet and reaches its high stage in September, so that it produces the maximum discharge into Lake Huron at the time that the level of that lake is being lowered most rapidly by evaporation and outflow.

The storage capacity of Lake Superior amounts to 28,000 cubic feet per second annually for each foot in depth on the lake surface, and in connection with Lakes Huron and Michigan forms a reservoir system absolutely essential for an adequate continuous volume of flow through the St. Mary's, St. Clair and Detroit rivers. Since the time of the greatest discharge into Lake Huron is that when a large supply is necessary for the maintenance of the level of Lakes Huron and Michigan, it is apparent that any modification of the range of levels of Lake Superior would be an injury to the entire waterway system, and, therefore, the natural conditions on that lake should be maintained.

The average annual supply of water to Lake Erie, (not including loss from evaporation) amounts to a volume about 28 feet deep over its entire area, and, since the annual evaporation does not exceed 2.6 feet in depth on the lake, it is evident that a sufficient positive inflow always exists to allow the levels to be maintained at a fixed stage without materially affecting the volume of discharge from the lake. The change of outflow which would be produced by regulation would accelerate the discharge during the first six months each year by an amount equivalent to the annual storage of the lake, and diminish the outflow a similar amount during the last half of each year. This modification will not affect the total annual discharge of Niagara river, and will amount to an increase of only 5 per cent of the annual discharge during the first half of each year, and a decrease of a similar amount during the last half. This modification will produce no measurable change in the levels of Lake Ontario.

It may be safely stated that a proper regulation of the level of Lake Erie will produce no injurious effect on the waterways of Lake Ontario and St. Lawrence river, and that such an improvement will increase the depth at low water on Lake St. Clair 2 feet, and on Lakes Huron and Michigan about one foot. The question to be decided is, therefore, can the level of Lake Erie be controlled at an elevation near its high water stage and thus improve the low water depths about 3 feet and insure a constant depth of channel for the entire season of navigation? Observations have recently been made from which, in connection with the record of the water levels of the lake, the discharge of Niagara river has been computed for every month of each year since 1865, and the actual supply to the lake for each month for the same period. When the lake is at its highest stage, the outflow is practically equal to the maximum supply, and, if such maximum inflow should continue constant for any length of time, a practical state of regulation would exist. That is, with inflow and discharge equal, the stage must necessarily remain constant. If, therefore, such works be placed in the foot of the lake that when the supply commences to decrease the outflow will be correspondingly diminished, the level of the lake will remain constant except as affected by winds. In order to obtain control of the lake level, it will be necessary to construct a fixed dam in connection with a system of sluice gates, such that when the gates are closed the low water discharge will pass over the crest of the dam, and, when the gates are all open, the maximum supply to the lake will pass through the works. For all intermediate volumes of supply, it is evident that the proper control would be obtained by closing the requisite number of gates.

The stage of the lake at which the level should be controlled is a matter for international consideration, and must have the approval of the Canadian government before the works can be constructed. While under existing conditions the elevation at which the level would have to be controlled is that of the high water stage of the lake, the regulation can be effected at any stage deemed advisable by simply increasing the cross-section of the gorge at the head of the Niagara river sufficiently to produce a corresponding lowering of the water below the works for the maximum outflow, similar to that which has occurred at the outlet of Lake Huron, where the natural deepening of the channel has permanently lowered the lake level about one foot. The natural conditions at the outlet of the lake are such that any necessary enlargement can be made at reasonable cost, and the stage at which the level of the lake should be controlled fixed at any elevation deemed desirable by the United States and Canada. If the adopted stage for regulation be lower than the ordinary high water of the lake, no damage to property rights could arise, and the usual low water depth during the latter part of the season of navigation, when the heaviest traffic on the lake occurs, would be improved about 3 feet.

*An address delivered at a meeting of the Cleveland Chamber of Commerce, October 17, 1899.

The benefits to be derived from the increased depth of harbors and channels of Lake Erie and through the Detroit and St. Clair rivers will be many times the amount that the regulating works will cost. A channel 600 feet wide through the waterway from Lake Huron to Lake Erie will soon be an absolute necessity to safely accommodate the rapidly increasing commerce of the lakes. The difference in the amount of money needed to construct such a channel under the existing conditions, or with the level of Lake Erie regulated, would be more than sufficient to build the controlling works at the foot of the lake. The improvement obtained would be permanent, which cannot be said of the results obtained by present methods, by which the enlarging and deepening of any section of the river channels produce a lowering of the water levels above the improvement. Improving of waterways by regulating the levels at a higher stage increases the area of the cross-section of channels and correspondingly decreases the velocity of currents, thus making navigation less dangerous—a condition very desirable to establish where channels are narrow and tortuous.

If it should be established that the control of the level of Lake Erie is a feasible and economical method of improving the low water depths of the lake, the question naturally arises as to what the existing conditions are which it is desirable to improve. The channels at the entrances of Lake Erie harbors, which originally had depths of 6 to 10 feet, have been deepened by dredging until unstable depths of about 17 feet have been secured, and which silt up more or less every year from the severe storms of the fall and winter seasons, and, unless made still deeper, the respective ports will not be able to reap much benefit from a 21-foot channel through the lake waterways.

At the Lime Kiln in the mouth of the Detroit river the natural depth at ordinary stage of the lake was formerly about 13 feet, through which a channel is reported to have been cut 440 feet wide and 20 feet deep. This improvement is the outcome of a resolution of the house of representatives on Dec. 18, 1873, which called for "an approximate estimate of the cost of deepening and widening the navigable channels of the rivers and waters connecting Lake Huron and Lake Erie for practical navigation for vessels drawing 20 feet of water." The project formulated on this resolution was for a curved channel through the reef 300 feet wide and 20 feet deep. This was modified in 1883, making the channel straight and of the same dimensions. In 1886, it was again modified by increasing the width to 400 feet, which was increased to 440 feet in 1888. In the report of the chief of engineers for 1891, page 2798, it is stated that: "The river and harbor act of August 11, 1888, appropriated $130,500 for improving Detroit river, Mich., to complete the work. When proposals were called for it was found that the lowest bid was at such a price as would not only suffice to complete the 400-foot channel, but an additional width of 40 feet; and upon presentation of the facts to the chief of engineers, the project was again modified, the additional width being gained on the American side of the cut, and a contract was duly entered into with the lowest bidders, Messrs. Dunbar & Sullivan, at the low price of $4.43 per cubic yard of solid rock and $1.00 for loose rock. Work under this contract was begun Oct. 27, 1888, and completed Oct. 1, 1890. Twenty-six thousand three hundred and four cubic yards of solid rock and 3,380 of loose rock were excavated, and the channel completed to a width of 440 feet and a depth of 20 feet. The work under this contract also included the removal of the five following shoals in the vicinity to a clear depth of 20 feet: Ballard reef (partly), Texas Shoal, Milwaukee shoal, Boston shoal and Hackett shoal."

On page 2818 of the same report, it is stated: "The obstruction which existed at the Lime-Kiln crossing, Detroit river, has been removed to the full depth of 20 feet for a width of 440 feet, and only a comparatively small amount of excavation on the bar at the mouth of Detroit river is required to secure a 20-foot channel from Lake St. Clair to Lake Erie."

Since the resolution of congress, on which the project for this work was based, called for a channel "for practical navigation for vessels drawing 20 feet of water," it would appear that the original wishes of congress have not been carried out or else some serious blunder has been made in the execution of the work, for, while it is officially reported that this work is completed and a 20-foot channel obtained, the fact is well known that there is a navigable channel across the reef today of less than 17¾ feet, and at mean stage of the lake the navigable depth is only about 18 feet instead of 20 feet as given in reports. So far as the speaker is aware, the project supposed to have been completed in 1890 has never been modified, except in 1892, when it was proposed to make the channel 800 feet wide and 20 feet deep, from the head of Ballard reef to the head of Lime-Kiln crossing, estimated to cost $180,000, and of which one-half was appropriated and expended previous to 1899; yet, in the river and harbor act, approved March 3, 1899, the following appropriation is made: "Improving Detroit river, Michigan, removing shoals from Detroit to Lake Erie, continuing improvement $100,000; provided that a contract or contracts may be entered into by the secretary of war for such materials and work as may be necessary to complete the same in accordance with the present project, to be paid for as appropriations may from time to time be made by law, not to exceed in the aggregate $661,500, exclusive of the amount herein and heretofore appropriated; provided further, that the secretary of war shall cause to be made and reported as practicable a survey of the Detroit river from Detroit to Lake Erie, with a plan and estimate of the cost of such improvement as will secure a safe and convenient channel 21 feet deep between said points."

The above appropriation cannot refer to the construction of a 21 foot channel, for the reason that the act itself calls for a survey and estimate for such a channel, and we must, therefore, conclude that the $761,500 appropriated is to construct a channel already officially reported as having been entirely completed in 1890. The fact is that the $761,500, apparently palmed off on congress as the amount necessary to complete an unfinished project, is shown by the reports of the chief of engineers to be simply the difference between the original estimate of what the engineers expected the work would cost—with rock excavation estimated at $25 per cubic yard—and the amount actually paid to contractors for completing the work called for under the plans of the engineer department, which has been reported several times as having been completed, and the full depth of channel required by project obtained. If the work for which the recent appropriation was recommended and obtained was for the purpose of a new project to secure a navigable channel for vessels drawing 20 feet of water, which the engineers in charge failed to obtain by the execution of the original project for this purpose, it should have been so stated, and the citizens of the lake district and their representatives in congress informed as to the nature of the project under which more beneficial results are to be obtained. This appropriation, if applied to the construction of properly designed regulation works, would improve the channel at the Lime-Kiln crossing, and of every harbor on Lake Erie, at least 3 feet, and give the lake waterways a constant depth for the entire season of navigation.

The condition of affairs indicated by these official reports and the vast sums of money being used on completed projects should receive the careful consideration of every one interested in the future commerce of the great lakes. Wider, straighter and deeper channels for harbors and through the Detroit and St. Clair rivers are an urgent necessity, and, if these desired results can be obtained with a saving of several millions of dollars by adopting more modern methods of improvements, as no doubt can be done, it should be our duty to carefully consider these methods, and, if they are found to be effective, safe, and economical, the proper steps should be taken to have them utilized at the earliest date practicable.

GREAT MEGAPHONES FOR FOG SIGNAL STATIONS.

Under the supervision of an engineer of the United States light-house board, tests were recently made at Falkner's island, off the Connecticut coast, with the largest megaphone in the world. It is 17 feet in length and 7 feet in diameter at the mouth and revolves upon a circular platform 28 feet in diameter. The plan for the operation of the megaphone contemplates its direction, in succession, to the eight principal points of the compass, a different signal being sounded at each stop, so that any vessel which may be in the line of the axis of the instrument during a fog will be enabled to determine its exact position with relation to the signal station. This would serve to obviate, of course, the difficulty which has heretofore existed in locating sound signals in a fog. The signals projected through the huge megaphone are 15 seconds apart and the apparatus makes a complete revolution in two minutes. In order to facilitate the recollection of the code all the sounds which indicate the general direction of west begin with a short blast and those indicating the general direction of east begin with a long blast. The south signals are all shorter than those farther north.

The chief point of dispute in regard to the new system was whether or not it would be possible to distinguish clearly between the sounds which were heard when the megaphone was pointed directly at a vessel and those which might be heard when it was pointed 45 degrees from it, which would be the next angle at which a signal would be sounded. Almost all the highest authorities on the subject denied that any distinction could be made. When the first experiments were made at Falkner's island the fog signal used was one of the smallest sirens procurable and was blown with steam at 40 pounds and fed by a 1½-inch pipe. This is scarcely 5 per cent of that of the sirens at Sandy Hook, Block island and Beaver Tail, and yet when blown through the large megaphone the sound of the small siren was found to be almost equal to that of a 10-inch locomotive whistle, and could be heard at ten miles. The results of the test were a complete surprise. It was found that sounds sent from an angle of 45 degrees instead of being nearly equal to those sent directly toward the observer were absolutely inaudible at all distances beyond a mile, and even at half a mile it required the closest attention to distinguish them, while the sounds coming directly toward the listeners were extremely powerful up to 8 miles, and at the shorter distances of 1 or 2 miles were almost equal in volume to the immense steam whistle which was sounded immediately after the megaphone for purposes of comparison. The new apparatus is the invention of R. F. Foster and the megaphone was constructed by E. B. Merriman of Boston.

SUCCESS OF COL. PAYNE'S YACHT.

The Aphrodite, Col. Oliver H. Payne's palatial steam yacht, which is generally acknowledged to be the queen of American pleasure craft, has been gaining fresh laurels and breaking records during the past few weeks. Although her builders, the Bath Iron Works of Bath, Me., guaranteed but 15 knots speed at sea, she has defeated the Puritan, which is credited with a speed of 21 statute miles; has run even with the City of Lowell, a 22½-mile boat, which was also built by the Bath firm; has broken the Grand Duchesse's long string of victories, and in a race for $5,000 a side she proved herself to be in a different higher class than the 17-knot new steam yacht Josephine, owned by P. A. B. Widener of Philadelphia. Many of the smaller high-speed so-called 20 to 25-mile boats have been left behind and the Aphrodite, although primarily an ocean-going cruising-rigged steam yacht, has proved herself superior in speed to all the yachts and coasting steamships that she has encountered.

All this is the claim, of course, of people interested in the Aphrodite, and will undoubtedly be disputed by the supporters of the other fast vessels referred to, but the Aphrodite is certainly a marvellous boat and it is a great wonder how she attains such speed with natural draft, with good coal supply and with her lofty spars, long yards and rigging.

A novel means of floating the Clyde line steamer City of Jacksonville, which was carried a quarter of a mile inland on the Florida coast by a September gale, has just been devised by Morelia Sardou, a young civil engineer of Philadelphia. His plan is to force, by means of compressed air, jets of water under and around the vessel until the formation becomes a liquid mass, enabling tugs to drag the boat off. The Atlantic Wrecking Co. will test the practicability of Sardou's scheme.

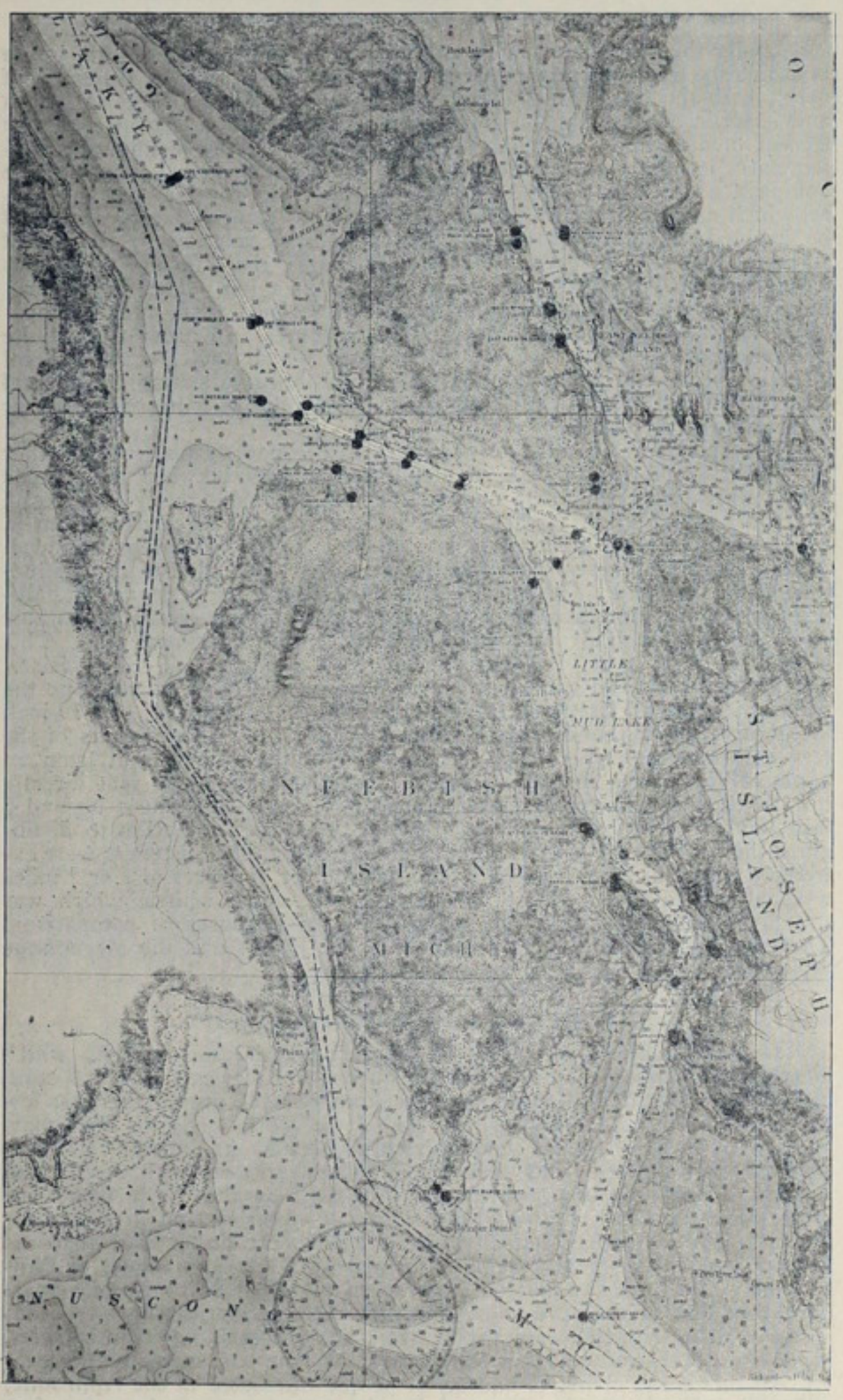
Officials of the Pennsylvania Steel Co. (parent organization) have just completed their annual inspection of the plant of the Maryland Steel Co. at Sparrow's Point, Md. They were especially pleased with the great amount of marine work on hand and the excellent progress being made thereon. The steel plant is also very busy. Three of the four furnaces are at present in blast and the fourth will be put in blast as soon as material can be obtained.

PROPOSED WEST NEEBISH CHANNEL.

A SECOND DEEP WATER WAY IN THAT PART OF ST. MARY'S RIVER WHERE THE DOUGLASS HOUGHTON WAS SUNK WOULD COST ONLY A TRIFLE WHEN COMPARED WITH THE GREAT INTERESTS AT STAKE.

About 700,000 tons of freight will not be moved from Lake Superior this season on account of a few days delay that occurred not long ago to the great fleet engaged in that trade through the sinking of the steamer Douglass Houghton at what is known as the Encampment in the St. Mary's river. Accidents of the kind that befell the Houghton are liable to happen repeatedly throughout the season of navigation, and it is a surprise to everybody who has a knowledge of the narrow channels of this river that the commerce of the Sault, which is the wonder of the world, amounting this season, as it will, to full twenty-five million tons, is not often delayed for weeks instead of days, in view of the danger of such disasters.

A sketch, made from a chart of the river and printed herewith, shows the channel to the eastward of Neebish island in which the Houghton was sunk, and shows also, by means of dotted lines, the proposed West Neebish channel, for the dredging of which the shipping interests should



SKETCH OF WEST NEEBISH CHANNEL—ST. MARY'S RIVER.
(Dotted lines to the west of Neebish Island show proposed new channel.)

immediately seek an appropriation from congress. It will readily be seen that if this west channel was available there would have been no delay on account of the accident that recently attracted the attention of the whole country.

The act of congress approved March 3, 1899, contains an item directing that a survey be made of the connecting waters between Lake Superior and Lake Huron, including Hay Lake channel, with a plan and estimate of the cost of such improvement as will secure a safe and convenient channel 21 feet deep between said lakes. Detail surveys have been made under direction of Colonel G. J. Lydecker, the engineer officer in charge of the district, from which the estimates are being computed, and these will include the cost of widening the canal above the locks, enlarging the Weitzel lock, and excavating a channel via Hay lake. The relative advantages of the West and Middle Neebish routes may have been fully considered and reported to the chief of engineers, who recommends, in his last annual report, the West Neebish route for improvement.

It remains for the vessel interests to take action before the opening of the next session of congress looking to the appropriation of funds for this work. No better object lesson is required than the sinking of the Houghton. The cost of this particular improvement is not at all important in view of the interests involved. The computed amount of material (unofficial) to be excavated for a channel 300 feet wide and 21 feet deep through the West Neebish, is approximately: Clay, 7,340,000 cubic yards; sand and boulders, 160,000 cubic yards; limestone rock, 1,385,000 cubic yards. The cost, at an estimated average rate of 36 cents per cubic yard, amounts to $3,200,000.

A similar computation for widening the present Middle Neebish route an additional 300 feet, making it 600 feet wide, gives the following quantities: Clay, 3,725,000 cubic yards; sand and boulders, 540,000 cubic yards; sandstone rock, 1,630,000 cubic yards; limestone rock, 125,000 cubic yards. At an average rate of 45 cents per cubic yard, the cost will be $2,700,000. The grade of the present channel is referenced to mean stage of water. To change it to lowest stage of river (as is the case with estimates referring to the proposed west channel), the additional deepening would cost $675,000, or in all $3,375,000.

PROPOSED CHANGE IN CLASSIFICATION OF NAVAL VESSELS.

Col. S. C. Lemly, judge advocate general of the United States navy, has just submitted his annual report to Secretary Long. There are a number of recommendations but probably the most important is that regarding a new classification for naval vessels. Col. Lemly first recommends a re-enactment of the law of 1888, which expired by limitation in 1893, for the relief of sailors or seamen who left the service in 1865, without the formality of a discharge, after faithful performance of duty in the Civil War and whose record shows a charge of desertion. He says that "the necessity of the enactment of some provision of law empowering naval courts-martial and courts of inquiry to secure the testimony of civilian witnesses is a matter of growing importance."

Regarding the classification of ships as now fixed by law, he says: "The changes which have taken place in naval construction during the latter half of the present century have been so radical that the classification of ships of war, prescribed by law hardly fifty years ago, has become obsolete. Under that classification no proper place can be found for a battleship or for modern cruisers, torpedo boats or vessels of the monitor type. The requirement that first rates be commanded as nearly as may be by commodores is likewise obsolete, the grade of commodore, so far as the active list of the navy is concerned, having been abolished. The classification of naval vessels according to the number of guns carried not being applicable to existing conditions, and it being undesirable to retain upon the statute books requirements which cannot be carried out, it is recommended that congress be asked so to change the statute as to establish a classification adapted to modern naval construction. While speed, armor protection, effectiveness of battery and other considerations might be taken into account in making such a classification, it is believed that the division of naval vessels into classes according to tonnage would prove in practice perhaps the most simple and satisfactory that could be adopted."

A considerable part of the report refers to the prize claims filed by officers and enlisted men under the old laws governing that subject. The act of March 3, 1899, repealing those laws, could not affect the cases arising out of captures made in the Spanish war of 1898. Claims have been transmitted to the treasury department for settlement in the cases of forty-four captured vessels.

WIRELESS TELEGRAPHY AT THE YACHT RACES.

Experiments with wireless telegraphy in connection with the international yacht races are said to have been entirely satisfactory. Communication with the shore was maintained from the steamers Ponce and La Grande Duchesse. The installation on the former vessel is herewith described.

The foremast of this ship was lengthened by a spar lashed to it so that its highest point, to which was attached the upper end of the vertical signal wire, was 140 feet above the water. The apparatus aboard consisted of an induction coil about 12 inches long, having an ordinary hammer interrupter, some thirty or more very large cells of dry battery, a key in the primary circuit of the coil, and the receiving mechanism. The instruments were installed in the chart-house of the ship, a room about 8 by 12 feet, just abaft the pilot-house on the hurricane deck. The vertical circuit consisted of a bare No. 10 copper wire hanging from an insulator on the masthead and running through a section of ordinary rubber hose where it entered the door of the chart house. The spark employed was about ½-inch long. The terminals of the coil (brass balls about an inch in diameter) were respectively connected to the vertical circuit described above and to the hull of the ship. When signals were to be received the sending apparatus was disconnected and the receiving coherer and its Morse recorder were connected. The instruments worked with great perfection, more than 2,000 words of bulletins of the race having been sent without repetition or misunderstanding.

In the chart house of the Commercial Cable Co.'s cable ship Mackay-Bennett, which was anchored near the Sandy Hook light-ship, a set of Marconi instruments was installed in charge of Mr. T. Bowden of London. During the yacht race sixty bulletins were received from the steamship Ponce, all of which were acknowedged. Forty-six messages were received without a break at the rate of fifteen to sixteen words per minute. The one break was due to a mistake of the sending operator and was quickly corrected. The longest distance over which transmission was accomplished was fifteen miles, a bulletin being received just as the yachts turned the further stake boat.

Mr. H. F. J. Porter, M. E., of the Bethlehem Steel Co., will deliver a lecture, illustrated by stereopticon views, on "The Position of Forging in the Arts" on Thursday, Oct. 19, before the Political Economy Club of the University of Chicago, in the lecture hall of the Haskell Museum.

SPEED IN WAR SHIP CONSTRUCTION.

Six months and twenty days elapsed between the laying down of the keel and the launching of the French armored cruiser Saffren of 12,504 tons, which is estimated to cost $6,000,000. There were nine months and nine days between the laying down and launching of the British battleship Canopas of 12,590 tons, the work having been somewhat delayed by a strike. The Fairfield Ship Building & Engineering Co., Ltd. of Govan, Scotland, built the British cruiser Diadem of 11,000 tons and 16,500 horse power in 214 working days. The Diadem is a sheathed ship and was fitted before launching with her armor casements on board. The British battleship Majestic was completed and launched in twenty-two months from the date of laying her keel. The Magnificent, another vessel of the same class, was completed in two years. The British battleship Prince George of 14,900 tons was built and launched in a little over eleven months. A 30-knot torpedo boat destroyer, the Sparrow Hawk, was built by Laird Bros. at Birkenhead, in 100 days.

SOUTHERN PACIFIC WHARF AT LOS ANGELES.

Although at this time not newly constructed, we take pleasure in presenting, as an interesting piece of engineering work, the accompanying half-tone view of the Southern Pacific mammoth wharf at Port Los Angeles, Cal., said to be the longest ocean pier of the kind in the world. The pier is the property of the Southern Pacific company and was built in 1893. It is a regular port for passenger and freight coast steamers, and is also a United States port of entry. It is twenty miles distant from Los Angeles and two miles from Santa Monica, Cal. The chief commercial use of the wharf is in the transshipment of cargoes of coal and construction material from the steamships of the Southern Pacific company to the same company's cars for use on its Southern California, Arizona and New Mexico lines.

The length of the wharf proper is 4,282 feet. It is 15 feet high above extreme high water and 24 feet above extreme low water. It is constructed as a pile trestle, the material in the piles and bracing being creosoted Oregon pine, and the balance of the material untreated Oregon pine. In the alignment of the pier there are two curves. On the shore approach there is a 10-degree curve extending 200 feet onto the pier, and 2,000 feet from the shore end there is a 7-degree curve to the right, both curves being tapered or spiraled. The trains run to the extreme end of the wharf.

In addition to the commercial use of the pier, it is said to be much in favor with fishermen. The photograph from which the accompanying illustration was reproduced was furnished us by kindness of Mr. T. H. Goodman, general passenger agent of the company, and is somewhat striking, we think, as an ocean view.—Railway and Engineering Review.

SOUTHERN PACIFIC WHARF AT PORT LOS ANGELES, CAL.

DEATH OF VICE-ADMIRAL COLOMB.

Vice-Almiral Philip Howard Colomb, whose death in his sixty-ninth year, was announced recently from his home at Botley, Hampshire, England, was everywhere regarded as one of the greatest authorities on naval warfare. His books found numberless readers in all countries, and for years before his death the distinguished officer occupied in Great Britain a position very closely approximating that of Capt. A. T. Mahan in America. His inventions were adopted by the British navy, notably the flash signals now in universal use, and he added much to his fame by final success, after twenty years' effort, in securing at the maritime conference in Washington in 1889 the adoption of important amendments to the rules for preventing collisions at sea.

Philip Howard Colomb was the third son of the late Gen. G. T. Colomb, who married a daughter of Sir A. B. King, Bart. He was educated privately. He entered the British navy in 1846, when he was only fifteen years old, and saw active service before he was seventeen years old, being engaged in suppressing an insurrection off the coast of Portugal. After this the young officer was engaged almost continually in warfare or hazardous service of one kind or another for many years. He was in the Mediterranean during the revolutionary epoch of 1848, and was in the squadron which was successful in partially suppressing piracy off the coast of China from 1849 to 1851. He took part in the Burmese war of 1852. In 1854 he was in the expedition to the Arctic regions. He took part in the Baltic campaign of 1855. He commanded the Dryad, sent to the East Indies in 1868, to suppress the slave trade, remaining in this service till 1870. He commanded the Audacious in Chinese waters from 1874 to 1877 and the Thunderer in the Mediterranean from 1880 to 1881. Then, until 1884, he was captain of the steam reserve at Portsmouth, and was flag captain at Portsmouth from 1884 until his compulsory retirement on account of age in 1886. Since that time he had lived the life of a country gentleman at his place, Steeple Court, Botley, Hampshire, occupying much of his time in writing. Among the important works by Admiral Colomb are "The Manual of Fleet Evolutions," published in 1874, the official manual of the British admiralty; "Slave Catching in the Indian Ocean" (1873), "The Dual; a Naval War Game" (1879), "Fifteen Years of Naval Retirement" (1886), "Naval Warfare" (1891), "Essays on Naval Defenses" (1893), "The Naval War Game, the Collision Diagram" (1896), and "Memoirs of Admiral Sir A. Cooper Key" (1898). Admiral Colomb was president of many department committees, including those on machine guns, fouling of ships' bottoms, invasions and victualing stores. He was nautical assessor to the house of lords, and a younger brother of trinity house.

STEAM YACHT DREAMER.

The Dreamer, a steam yacht recently launched at Lewis Nixon's Crescent Ship Yard, Elizabethport, N. J., for Thomas W. Lawson of Boston, promises to be, when completed, one of the best vessels of her class afloat. The yacht was designed by Tams & Lemoine of New York, who also designed the J. Pierrepont Morgan yacht, and they devoted their best efforts to making her a good cruising yacht with more reference to safety and comfort than to speed. Nevertheless her builder is confident that the boat can do considerably better than contract stipulations, which provide for 12 knots under natural draft and 14 knots under forced draft.

The Dreamer is 182 feet in length over all, 150 feet on the water line, and 23 feet beam. She is of steel construction with a continuous steel deck to which are riveted her steel-framed deck houses. The boat has five watertight bulkheads. She is propelled by a single screw which is operated by a triple expansion engine, to which steam is supplied from Almy water tube boilers. The bunker capacity is such that she can steam 5,000 miles without recoaling.

The owner of the Dreamer expects to use her extensively in Mediterranean and West Indian cruises, and the interior furnishings have been selected accordingly. On the main deck forward is the dining room and smoking room, and these rooms as well as the vestibule leading to the owner's quarters are finished in new waxed oak with green silk hangings and brocade panels. The after house contains a ladies' boudoir, which is finished in Louis XV style in white ivory and brocaded silk panels. The owner's suite is below, forward. It consists of two state rooms, one 18 by 10 feet and the other 14 by 12 feet. A bathroom adjoins the suite. Forward, for the use of guests, are five double state rooms, with bathrooms. These rooms are finished in ivory white enamel with tapestry panelling, and are furnished with brass bedsteads and mahogany furniture. There are two other private state rooms and bath in the after part of the vessel, and here also is the library, a room of 15 by 12 feet, supplied with piano, bookcases, desks, fireplace, etc. The accommodations of the yacht permit of a crew of twenty-four and sixteen guests. The Dreamer will carry four boats, a 25-foot launch, two gigs and a single rater. Her equipment, including electric light plant, distillers, refrigerating plant, etc., is very complete.

A new yacht has recently been added to the fleet on the inland rivers of America. The addition is the Brook Hill, owned by the Paducah Yacht Club. The hull is of selected white oak, 50 feet long, 10½ feet beam and 4 feet deep from top of covering board to top of keel. The deck is of white pine, watertight, and painted. The superstructure, or cabin, is of cherry and maple and incloses the engine room, buffet and lavatories. The yacht is fitted with an 8 by 8-inch high speed marine engine capable of 250 revolutions per minute with a 36-inch three-blade steel propeller. The boiler is a submerged tube marine, 48 by 72 inches, and is allowed a steam pressure of 150 pounds. The equipment includes a handsome searchlight of 1,000 candle power, manufactured by Carlisle & Finch of Cincinnati.

MARINE REVIEW

Devoted to the Merchant Marine, the Navy, Ship Building, and Kindred Interests.

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As repeatedly noted in these columns, the industrial and engineering journals of England have for more than a year past been reflecting in numerous communications and editorial articles the fear of American competition that exists among British manufacturers. Now comes Engineering of London, one of the greatest technical journals of the world, with the bold statement that manufacturers of the United States are steadily becoming more dangerous antagonists of their English competitors, not only throughout Great Britain, but in foreign markets, and especially those markets which the British manufacturers have been accustomed to regard as their own. If this fear is so great now, what will happen when the present enormous home demand is cared for and when our manufacturers, with greatly increased facilities, especially in steel and iron lines, begin to look in real earnest for other fields? The keen interest in this question now shown by British manufacturers has prompted Engineering to invite the co-operation of a number of prominent Englishmen and Americans to speak on the subject as they think best, each approaching it by his special path of knowledge, and dealing with it as he may think most useful. As an introduction to these communications, which are already being printed, the London journal says: "For a long time past our manufacturers, merchants, and shippers have been unable to close their eyes to the fact that since the United States have recovered from the effects of the panic of 1893, they have steadily become more dangerous antagonists, not only in this country, but in foreign markets, and especially in those markets which we have been accustomed to regard as our own. It is still urged by not a few persons that this competition is factitious; that in order to take away our customers, goods are supplied by enterprising Americans at a loss; that the articles forced on the markets of the world in preference to our own, are of inferior quality, and will not stand the test of time and use, and that this spurious phase of manufacture and commerce, is but transient. But those who are able to take a broader view know that such statements are fallacious; they know that in many manufactured products the United States can beat us in price, and at least equal us in quality; they know that at present, and still more in the near future, the struggle of competition will grow keener, and that the advantages of this struggle do not lie with us. The causes of these advantages are probably not understood by any one person, though the results may be keenly felt by all, and we believe that we shall be rendering a service of the highest value to British manufacturers if we are able to throw some light on the many aspects of a complicated problem by the proposed discussion. We are convinced that such a collection of authoritative views will teach our industrials where America is strong and where we are weak, and the converse; will suggest what methods we may modify or adopt to our own profit; and will prove that the true way to overcome an adversary is not to despise him, but to be familiar with his strength."

Invitations were sent out this week for the seventh general meeting of the Society of Naval Architects and Marine Engineers, which will open in New York on Thursday, Nov. 16, and the full program of which was presented in the naval edition of the Marine Review. As on former occasions the president and managers of the American society of mechanical engineers have extended the courtesy of the use of their rooms at 12 West Thirty-first street. The sessions of the convention will extend through Thursday and Friday and the meeting will close with a banquet at Delmonico's on Friday evening, to which members and their guests are cordially invited. The council will meet at the address above given at 3 o'clock Wednesday afternoon, Nov. 15, and it is requested that all members intending to propose candidates for membership return the filled out applications to the secretary on or before Nov. 14.

This entire issue of the Marine Review might be filled with letters of congratulation and with newspaper clippings from all parts of the country pertaining to the special naval edition of Sept. 28. These favors are fully appreciated, but it would, of course, be unfair to give up to a parade of our own glory space that may better be applied to the kind of live reading matter that is printed from week to week in these columns. The best evidence in the office of the Marine Review of the success of this edition is the fact that every mail brings orders for extra copies of it as well as yearly subscriptions to begin with that particular number. There are others in view, that will, of course, be on different lines, but in every respect equal, if not better, than the last one.

The New York Ship Building Co. which is erecting a plant at Camden, N. J., was incorporated in that state a few days ago. The company is authorized to manufacture and deal in all kinds of marine and nautical supplies. The capital stock is $3,000,000 and the incorporators are Henry G. Morse and George L. Brown of Woodbury; Charles S. Hall and William F. Granan of Wilmington, Del., and William G. Randle of Chester, Pa.

The battleship Kearsarge has returned to the yard of her builders, the Newport News Ship Building & Dry Dock Co. She made the trip from Boston to Newport News in just forty and one-half hours, and her average cruising speed for the entire trip was 14.1 knots per hour under natural draught. Her fourteen 5-inch rapid fire guns will be put on board within a few days.

THE STRUGGLE FOR SHIPS.

ROCKEFELLER HAS ABOUT SIX MILLION TONS CAPACITY OUT OF A TOTAL OF FOURTEEN TO FIFTEEN MILLIONS ALREADY UNDER CONTRACT FOR NEXT YEAR.

As regards lake freights, the ore business of 1900 is practically closed up. Tonnage to move between fourteen and fifteen million gross tons is engaged. This includes, of course, the big fleets owned or controlled by the ore companies. The Rockefeller interest has about six million tons of this capacity (as near as can be figured), this total involving say 2,500,000 tons in the twenty-seven Bessemer ships, 1,500,000 in thirty whalebacks and about 2,000,000 tons chartered. It is quite evident, no matter what may be said to the contrary, that the Rockefeller representatives have started out to not only maintain lake freights on a basis of $1.25 from the head of Lake Superior, but to also mine and sell ore to consumers generally on the biggest possible scale next year, irrespective of their relations with the Carnegie company. They are evidently figuring also on an output of ore in 1900 approaching the 20,000,000-ton mark and expecting that the Carnegie company, as well as the Federal Steel and other big concerns, will be caught short of vessel capacity on account of contemplated large increases in output.

Representatives of consuming interests, on the other hand, insist that the situation is overdrawn, and that there is still quite a large amount of vessel capacity over and above the fourteen million tons to be drawn upon. They admit that there is more than 2,000,000 tons of new furnace capacity to be built by the Carnegie company, by the American Steel & Wire and National Steel, but they say that the amount of next season's ore to be consumed by these new furnaces will be a very small item, on account of the great length of time that must elapse before the furnaces are completed.

However this may be, it is a fact that all vessels offered for next year are still being taken on the $1.25 basis, and it is announced by the Rockefeller representatives that they are not yet through. The rate would certainly have been no more than $1 if it were not for the move made by the Rockefeller interest when the Carnegie company proposed to pay $350,000 each for four steel steamers owned by John Mitchell and others of Cleveland. It was this transaction that started the ball rolling.

The Carnegie company is still figuring on the purchase of ships. In addition to the steamer Black, which they purchased a few days ago (price said to be $360,000) they will have the Chicago steamer Lynn and consort Carrington, either by charter or purchase. James Davidson is said to be figuring with one of the large Cleveland concerns for the sale of his entire fleet of wooden vessels. Corrigan, McKinnie & Co. of Cleveland have purchased from the J. Emory Owen Transportation Co. of Detroit the wooden steamer J. Emory Owen and consort Michigan.

NORTHWESTERN GRAIN SITUATION.

Duluth, Minn., Oct. 18.—One of the leading vessel agencies makes this summary of the grain freight market: "We are offered for vessels to load here, on the opening of navigation in 1900, 3½ cents on wheat to Buffalo. This is not as good a rate as was paid some time ago when the market was somewhat stronger than it is at present, but from the fact that shippers are still trying to engage tonnage for next year it would seem that they look for a heavy grain movement in the spring. Inquiry for steel tonnage to move cargoes late in November and hold the grain in Buffalo all winter has been a feature of the market for several days past. Some business of this kind was done at 5½ cents. Requests for current tonnage come almost exclusively from coarse grain shippers. Wheat shippers still complain of the absence of export demand, but the supply of vessels under contract to carry grain at low rates is now practically exhausted and shippers must hereafter enter the market when they desire ships. More than eight millions of wheat are in store here. If a demand for grain should suddenly arise during the next fortnight this market would be in splendid position to furnish it quickly. The wheat is owned by the elevator companies and it will require a considerable premium to persuade them to part with it.

All coal companies complain of short supplies. While receipts have been about equal to preceding years, the western consumption seems unlimited. One railroad centering in Chicago, with no terminals at the head of the lakes, was endeavoring, a few days ago, to purchase a quantity of coal from local wholesalers.

FROM BATH SHIP YARDS.

This week the New England Ship Building Co. of Bath, Me., closed a contract to build a trio of barges for the B Line Transportation Co. of New York, to be ready for service in January, 1900. These vessels will measure 180 feet keel, 33.5 feet beam and 18 feet depth, and they are designed to have a dead weight capacity of 1,700 tons each. The New England company has just finished the barges Bath and Bangor for the B Line company. The new barges will be built under the supervision of Capt. Frank Ross of New York.

The seven steel vessels to be built by Arthur Sewall & Co. of Bath, Maine for Dimond & Sewall of San Francisco are modern A 1 barques and not barges as reported in last week's issue. As Arthur Sewall & Co. have already built four large steel shipentines, the days of American steel sailing ships cannot be said to be as yet a thing of the past.

Wm. Rogers of Bath has closed a contract with Palmer of Massachusetts for another large four-masted wooden coasting schooner, similar to the one on the stocks in his yard.

It is reported that a large six-masted schooner will be built in Bath during the coming winter.

The Wm. Cramp & Sons Co. of Philadelphia, has received a telegram from Engineer Cox, who accompanied the recently completed Japanese cruiser Kasagi, stating that the vessel is entirely satisfactory to the Japanese government.

FROM NAVAL HEADQUARTERS.

A SUMMARY OF THE CHIEF CONSTRUCTOR'S REPORT--PREPARING FOR BIDS ON THE NEW CRUISERS--BARRACKS AT NAVY YARDS.

WASHINGTON BUREAU, MARINE REVIEW, 1345 PENNSYLVANIA AVENUE, WASHINGTON, D. C., OCTOBER 18, 1899.

The annual report of Rear Admiral Hichborn, chief of the bureau of construction and repair, navy department, is a most voluminous document. The constructor submits estimates to cover the cost of the construction and repair of vessels for which congress has already made provision and those now on the naval list. The repair program aggregates $6,000,000, which is double that of last year. In regard to this estimate the admiral says:

"It has been and will continue to be found necessary to expend comparatively large sums in connection with the repair of the older vessels in making the alterations necessary for their efficiency according to modern ideas and practice. For instance, the alterations and repairs to the Cincinnati and Raleigh, now under way, will require an expenditure of about $500,000 under this bureau. The estimate is based upon the expenditures of last year and those of the first two months of the present year, during which time it has been found necessary to exceed the proportionate monthly allowance for the various yards."

Admiral Hichborn and Admiral Melville submit joint estimates of the amounts required for work on the new vessels authorized by congress at its last session—three armored cruisers, three battleships and six unprotected cruisers. The joint estimates amount to $27,409,981, but $8,676,880 had already been appropriated and was in the treasury to the credit of the navy department on July 1, 1899. The estimates cover the cost of construction and machinery for the period beginning July 1, 1899, and ending June 30, 1901.

In discussing the need of docking facilities for naval vessels the constructor's report says: "The completion of the additional dry docks authorized and appropriated for will, to a certain extent, remedy the unfortunate condition now arising from lack of docking facilities, particularly with reference to the larger vessels. It should be pointed out, however, that the present program does not affect the two most important navy yards—New York and Norfolk—at each of which a new dock capable of taking the largest vessel is urgently needed. The naval constructor at New York reports that during the past fiscal year dry dock No. 1 has been occupied thirty-six days; No. 2 190 days and No. 3 204 days. No. 3 is the only one of these docks capable of taking in a vessel larger than the New York. At Norfolk the larger dock is only capable of taking vessels of the size of the Texas at light draught. During the past fiscal year it has been occupied 285 days and the other docks 292 days. The number of battleships in commission will be doubled in the near future, and the time is not very far distant when extensive repairs to the earlier ones may be required. It is important that the yards capable of handling the work properly in other respects should not be crippled by inadequate docking facilities."

The admiral also recommends that three marine railways be built at the New York navy yard and one each at the Portsmouth, League island, Norfolk, Port Royal and Mare island yards.

In speaking of the new vessels and the failure to begin construction upon them the admiral says: "The act of congress making appropriation for increase of the navy for the fiscal year ending June 30, 1900, approved March 3, 1899, provided for the construction of three sea-going coast line battleships, sheathed and coppered; three armored cruisers, sheathed and coppered, and six protected cruisers, sheathed and coppered. Under the provisions of this act the preliminary designs were begun for the battleships and armored cruisers, but work thereon has been suspended owing to the clause in the act forbidding the letting of contracts for hulls until after the armor shall have been contracted for at a price within the limits fixed by congress."

The work upon the gunboat to replace the Michigan has been suspended pending a definition of the characteristics that may be permitted under the treaty with Great Britain.

The probable date of the completion of each of the battleships is given as follows: Kearsarge, January, 1900; Kentucky, February, 1900; Illinois, October, 1900; Alabama, January, 1900; Wisconsin, May, 1900; Maine, June, 1901; Missouri, February, 1902; Ohio, March, 1902.

Speaking of the war Admiral Hichborn says: "The operations of the contending fleets in the West Indies gave a clear object lesson as to the strategical and tactical advantages of sheathed over unsheathed ships. The bureau in the past has consistently recommended the adoption of this feature for a fair proportion of the new construction and considers its adoption for the battleships and cruisers authorized by the last congress as a matter for congratulation for all concerned. In its last annual report the bureau commented on one of the most important features of ship's design emphasized by the recent war experience, viz.: The necessity for restricting the use of combustible material on board ship. During the past fiscal year the older ships have been improved as opportunity offered both in this respect and in the apparatus fitted for fire extinction. The very general attention attracted to this problem has resulted in an increase in the number of commercial non-combustible materials, but so far there has not been developed any material more suitable for general purposes than the fireproofed wood as at present used, though some progress has been made in the way of developing material for special purposes."

Some doubt has been entertained by navy officials as to whether the ship yards, in view of the rapid advance in steel, could bid within the limit of appropriations for the six new cruisers for which proposals are to be opened on Nov. 1. Assurances have already been received, however, indicating that a number of the firms will contract to build the vessels for the money available. The law limits the cost of each to $1,000,000, but of this the government requires about $100,000 to equip each ship after delivery to the navy department. In order that the builders may be able to undertake the vessels within the limit, it is understood that naval officers will waive the amount that should be set aside for their use and ask for special appropriations to cover the deficit. Otherwise it is conceded that it would be impracticable to build all the vessels for the sums allowed, with the prevailing high price of steel. These vessels are a part of the program of increase of the navy authorized at the last session. This program also includes three large battleships and three armored cruisers, equal in steaming and fighting effectiveness to the most formidable of their type in the British service.

Owing to the unsettled condition of the steel market and the failure of congress and the armor firms to come to terms, no progress has been made toward the preparation of the designs of any of these vessels, and no steps in that direction can be taken until the navy department is authorized to purchase armor at higher rates than those now allowed by law. So determined are the armor manufacturers to force the government to accede to their demands, it is said, that it is realized by ordnance officers that the government must make its own armor or pay the price demanded by the firms which have furnished all the armor heretofore supplied if the work of increasing the navy is to continue. The firms are in a position to concede little, owing to the abundance of other work which they declare is more profitable than contracts from the navy department.

The six new cruisers, however, require no armor and can therefore be built regardless of the cost. Should they have had even a thin protection on their water lines it is doubtful if they could have been built under present conditions. In any event they will be more costly for their displacement than many of the recent ships of equal class that have been built. In type these cruisers will be not unlike the Raleigh and Cincinnati but with less horsepower and reduced speed. The former vessels have frequently been said to have engines powerful enough for battleships and as coal burners are the most expensive in the service. The new ships will have a displacement of 3,100 tons, a speed of 17 knots and a large coal capacity and large steaming radius. The interest manifested by ship builders indicates that bids will be received from all the leading firms of the country and possibly many of the small ones. It is said that the Wm. R. Trigg Co. of Richmond, Virginia, is to be among the competitors.

Firms which are certain to bid are the Cramps, the Newport News Co., Bath Iron Works, Harlan & Hollingsworth Co., Columbian Iron Works of Baltimore, Maryland Steel Co. and very probably a new concern, the New York Ship Building Co. The Union Iron Works of San Francisco may also enter the competition. With sheathed bottoms that will prevent fouling in tropical waters, fin keels and a powerful battery of rapid fire guns, the new cruisers are expected to be equal to any of their class in the service and superior to the Raleigh and Cincinnati in all important points. In awarding contracts the naval authorities hope the ships will be so distributed that not more than two will go to one yard, and if the bids are such that new firms can be awarded contracts the department will be better pleased, as quicker work will be assured. The vessels must be completed and turned over to the government in two years from date of contract.

Rear Admiral A. S. Crowninshield, chief of the bureau of navigation, has submitted to the secretary of the navy estimates amounting to $2,400,000 for the construction of barracks at important navy yards, to take the place of receiving ships. The largest estimate submitted is for barracks to be built at the New York navy yard, which Admiral Crowninshield believes will cost at least $800,000. It will accommodate 1,000 men Barracks will also be constructed at Boston, League island, Norfolk and Mare island, to cost $400,000 apiece and to accommodate 500 men each.

RECOVERED ANOTHER WRECK.

Kingston, Ont., Oct. 16.—Mr. John Donnelly, Jr., of the Donnelly Salvage & Wrecking Co., has just returned from Quebec, where he was successful in placing the steamer Porter safely in Russell's ship yard for repairs. The Porter was run into and nearly had her nose cut off, the colliding steamer ploughing her way into the Porter right through the keelson and four feet beyond. The Porter went down in 45 feet of water near St. Croix, thirty miles west of Quebec. There is considerable current at this spot and it is greatly increased by changing tides, making wrecking operations very difficult. The tender of the Donnelly Wrecking and Salvage Company to raise the sunken steamer was accepted and in undertaking the work, John Donnelly took with him from this place the schooner Grantham and wrecking steamer Donnelly, together with a force of men. After fitting out at Quebec the wreckers started to work at the Porter. With considerable difficulty six large chains were placed under the steamer and fastened to timbers spread across the schooner Grantham. Then the steamer was slowly hoisted until her deck was only 4 inches below the bottom of the schooner. In this way was the wreck towed to Quebec and beached, afterwards being pumped out. Before the work of raising the steamer could be proceeded with a new bulk head had to be built across the portion cut away in the collision. This opening was 16 by 28 feet and was built up with deals, covered with canvas. The steamer was laden with 300 tons of coal, into which had worked about 150 tons of sand from the river bottom. The coal was sold to Quebec parties. The insurance companies were represented by Capt. Overton, New York, who was greatly pleased with the success of the wrecking operations. The repairs to the steamer will cost about $10,000.

A very interesting piece of work is now under way at the well known Vulcan works at Stettin, Germany. The Atlantic liner Kaiserin Maria Theresia is being lengthened 66 feet and simultaneously is being converted from a single to a twin screw vessel. Her one engine of 11,500 horse power will be replaced by two having an aggregate of 16,000 indicated horse power.

The Laidlaw-Dunn-Gordon Co. of Cincinnati is taxed to its fullest capacity to fill foreign orders now in hand. Among recent shipments made by the company were twenty-eight pumps to Shanghai, forty-two to Copenhagen and three to England.

LANG RADIAL VALVE GEAR.

A NEW GEAR THAT HAS BEEN APPLIED TO SEVERAL SMALL STEAM VESSELS ON THE GREAT LAKES—PROMISE OF ITS USE ON SOME OF THE LARGE FREIGHTERS.

BY LINCOLN A LANG. YULE, N D.

The Lang valve gear ranks under the heading of radial valve gears, but contains some remarkable features which it is claimed have not hitherto been incorporated in any one system. It may be applied to any reversable or non-reversable engine of ordinary type for a comparatively small outlay. The functional properties of the gear are as follows:

Constant lead; rapidity of movement when opening and closing ports; long exhaust period; large port opening when cutting off short; equalization of cut off points throughout expansive range; wide range of expansion; simplicity; reduction of valve moving energy; sensitiveness to manipulation of reverse lever or governor; large percentage of wear brought to one fixed and easily accessible point; small obstruction to the care and manipulation of main bearings, crosshead guides, etc., etc.

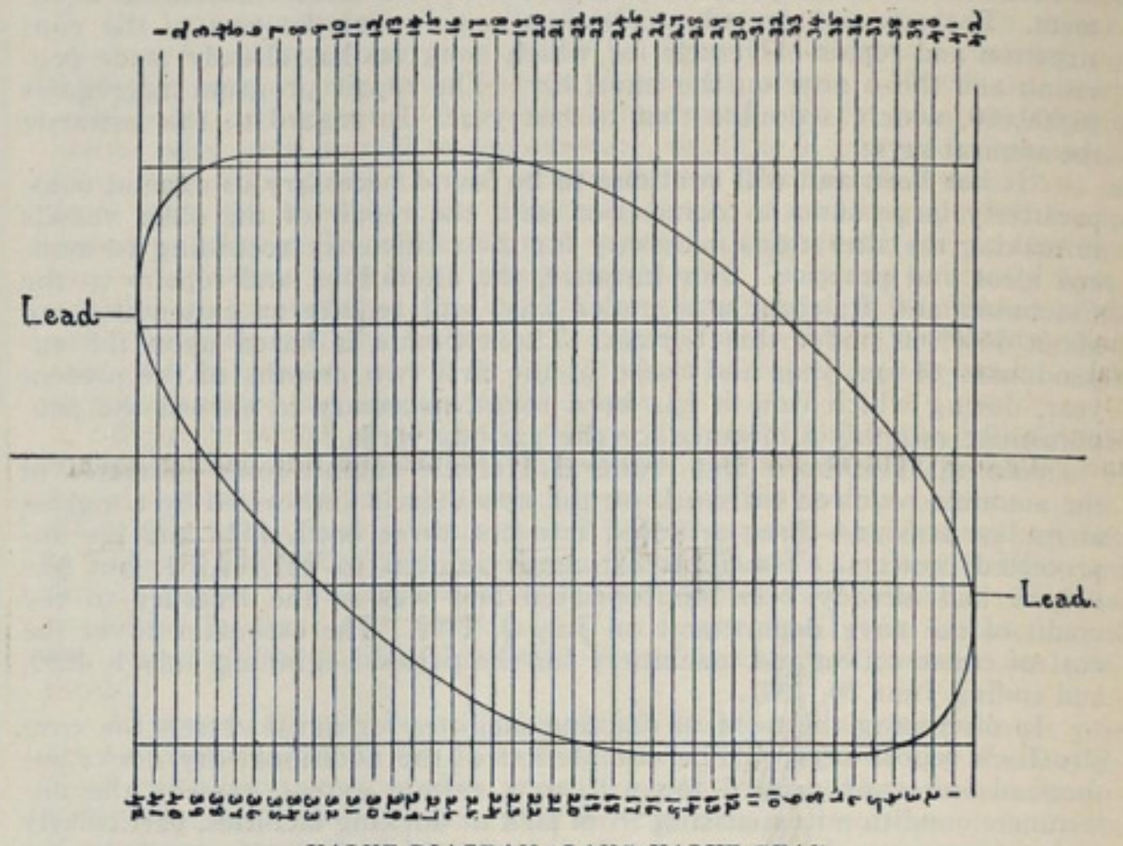
There are at the present writing ten of these gears either in actual use or in course of construction. The results obtained are very uniform and have fully substantiated the claims made for the system. Three of the gears have been in use for some time on the following vessels: Tug Islay, owned by the Superior Ship Building Co.; tug Bob Teed, capt. C. H. Hale, Ashland, Wis.; steamer Lucille, Capt. H. R. Brower, Ashland, Wis. In all these cases the Lang gear was substituted for the Stephenson link motion, with the result of a notable saving in fuel, the average on these three boats over their various expansive ranges being almost 30 per cent, the capacity of engines being, of course, correspondingly increased as proved by their ability to easily attain from twenty-five to thirty more revolutions per minute for the same fuel expenditure than was possible previous to the installation of the new system. Besides this the engines showed much less vibration than formerly.

The quick-opening feature of the valve establishes steam chest pressure in the cylinder very early in the stroke and frees the exhaust correspondingly early; then the long pause of the valve allows ample time for the exhaust to clear itself, affording freedom from back pressure, while the quick-closing avoids a long wire drawing cut.

Freedom from vibration is due to three causes which may be cited as follows: First, the lead is constant; second, the long exhaust period precludes all necessity for inner lead or clearance, affording sufficient compression to balance the lead; third, admission cut off, and compression occur at like points for either end of cylinder.

Reference to the accompanying valve diagram will make the movement clearly understood. The motion curve was developed from a model and is fairly representative of the action as applied to existing conditions. The curve may be improved where conditions are made to conform to the gear. Beginning at lead, on left hand of diagram the curve rises very rapidly, opening the port three-quarters of its area during the first inch of piston travel. At 3¼ inches of stroke the port is fully opened, and at 5 inches the valve has attained its maximum displacement. The valve now remains stationary up to 17 inches, or during a period equal to 12 inches of the stroke. The curve now begins to fall, at first slowly, then more rapidly until the point of cut off is reached at 32½ inches, or rather over three-quarters of the stroke. Compression begins at 38¾ inches (on the supposition that valve is set line and line inside) and at 42 inches, or end of stroke, the opposite port is open to the lead. The return curve is almost a duplicate. If the point of cut off were carried to 38 inches (which might be desirable in non-condensing engines) the port would be opened wide at 2 inches of the stroke, the curve, of course, rising correspondingly higher.

In the accompanying tracing, Fig. 1, shows an end elevation of the gear as applied to marine engines, Figs. 2 and 3 being explanatory diagrams. In the end elevation 1 is the main shaft, 2 an eccentric keyed thereon, 3 the eccentric strap carrying eyes 4 and 5 as shown, 6 a fixed shaft which in compound engines may, if desired, extend the length of the bed plate and parallel with the main shaft. It is supported and maintained rigidly in place by means of stools bolted to the bed plate at intervals (one of these being shown at 7), or by means of brackets cast with the main columns. Upon the shaft 6 (which constitutes the main fulcrum pin of the gear) are mounted a pair of bell cranks or triangular frames, one of which is seen at 8; the other being behind does not appear. These bell cranks, or frames, may be cast from steel in one piece if desired, a pair being requisite for each cylinder, all of them being mounted on the shaft 6 as shown. The eye 4 on eccentric strap is pivoted to and between the long arms of a pair of these frames so that they move as one. A link 9 carries central trunnions on each side, which are journaled between the short arms of frames as shown at 10. The link being thus supported is



VALVE DIAGRAM—LANG VALVE GEAR.

free to swing on its trunnions between the frames; 11 is a pivot carried by the link and located on the mean tangent of same; 12 is an adjustable rod connecting pivot 5 on eccentric strap with pivot 11 on link; 13 is a radius bar connecting valve stem with the link block 14; 15 is a drag link or bridle connecting radius bar 13 with reverse arm 16 and adapted to place and hold the link block in any desired position in the link; 17 is the crank pin shown on upper center, the gear being represented in its correct relative position.

The eccentric is set 112° behind the crank pin when the engine is going ahead, and leads the pin by a like amount when going astern. As 6 is a fixed point, it will be obvious that one effect of movement of the eccentric will be (through medium of the triangular frames) to reciprocate the link bodily, this movement being made equal to the lap + lead × 2.

Pivot 4 is restrained to travel through an invariable path or arc, due to its connection with 8, which causes pivot 5 to travel through an ellipse whose major axis is parallel to center line of engine a. This movement being transmitted to pivot 11 by the rod 12 causes the link to oscillate on its trunnions, thus giving to the link block a further travel than already acquired through the frames. When the block is in the center of link the valve will open the ports only to the amount of the lead; upon movement of the block either way from the center, the port opening becomes larger and the point of cut off later. It will be plain that one end of the link produces the reversed action of the other end. The throw of the eccentric should usually be about two-thirds of that employed where the Stephenson link is used, but this is capable of variation either way at the hands of the designer.

It will be noted that the eccentric obtains a powerful leverage on the link center, due to the difference in length between the long and short arms of frames, shaft 6 constituting the fulcrum. Similarly, a leverage is obtained with regard to the port opening movement. In this case point 10 becomes the fulcrum, which will be plain if we regard the distance from

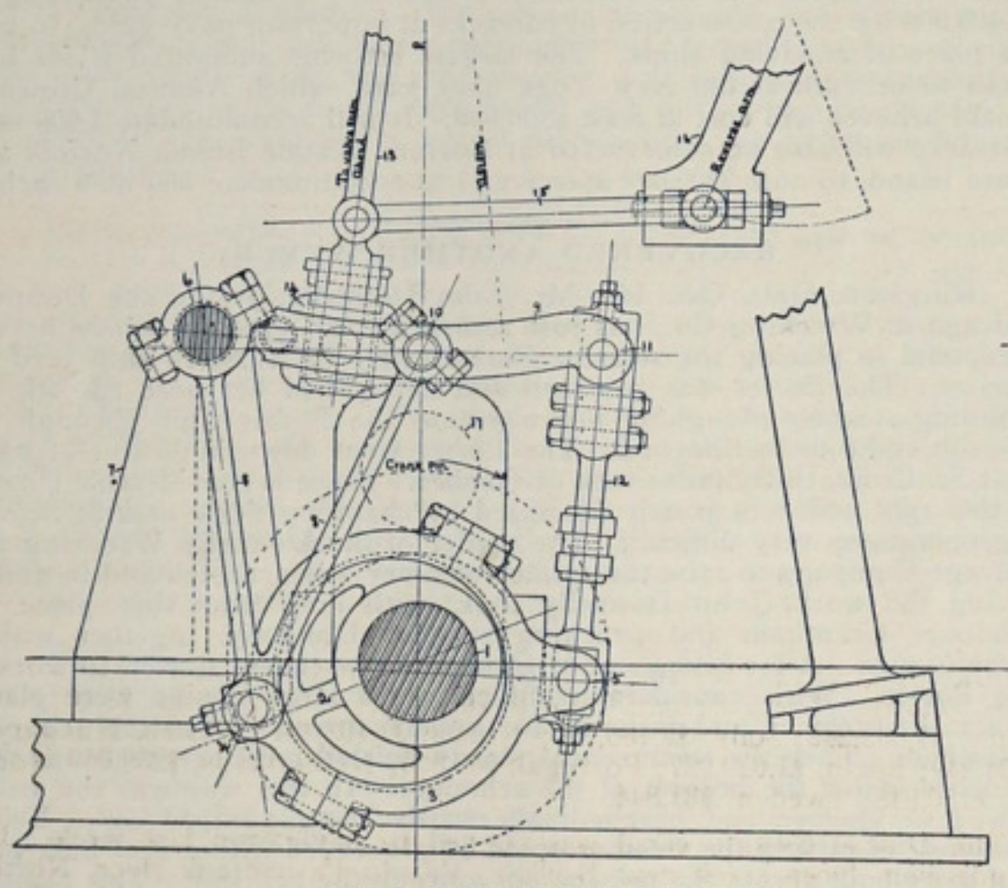


FIG. 1. END ELEVATION OF GEAR.

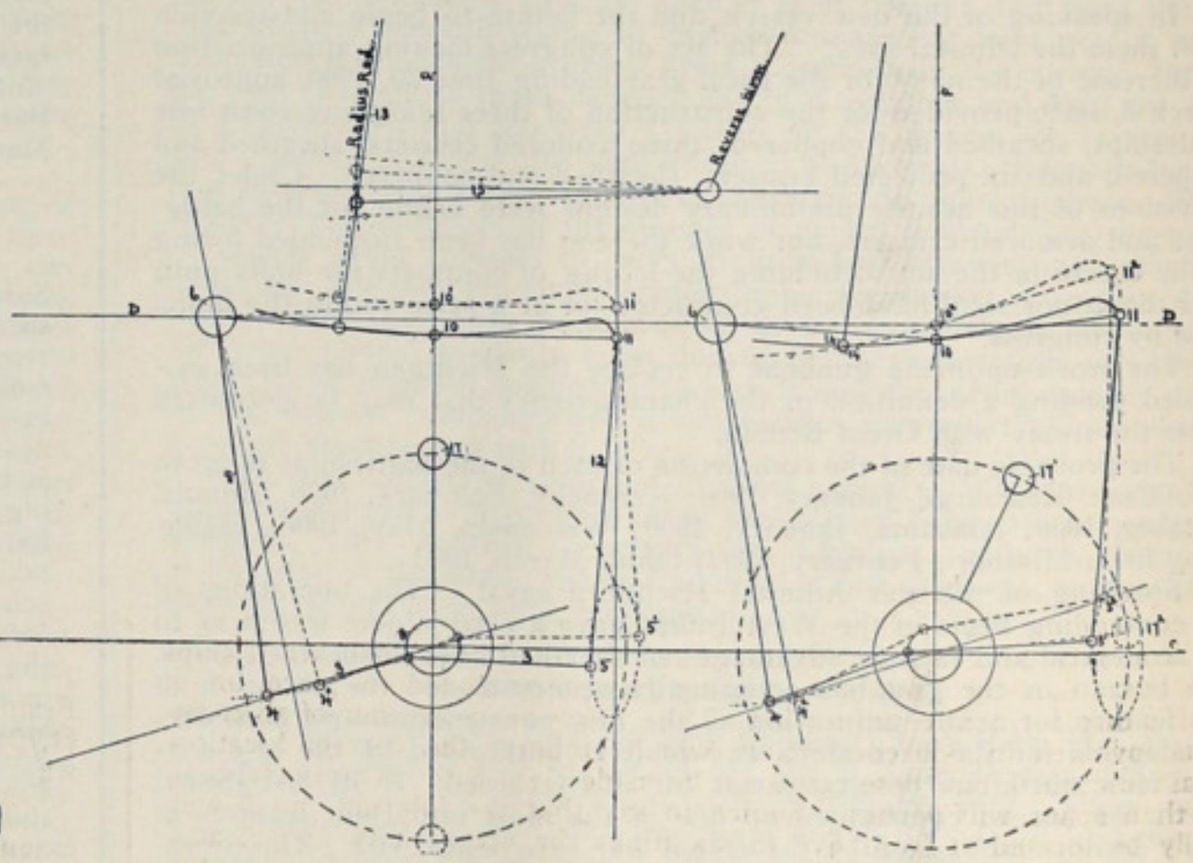
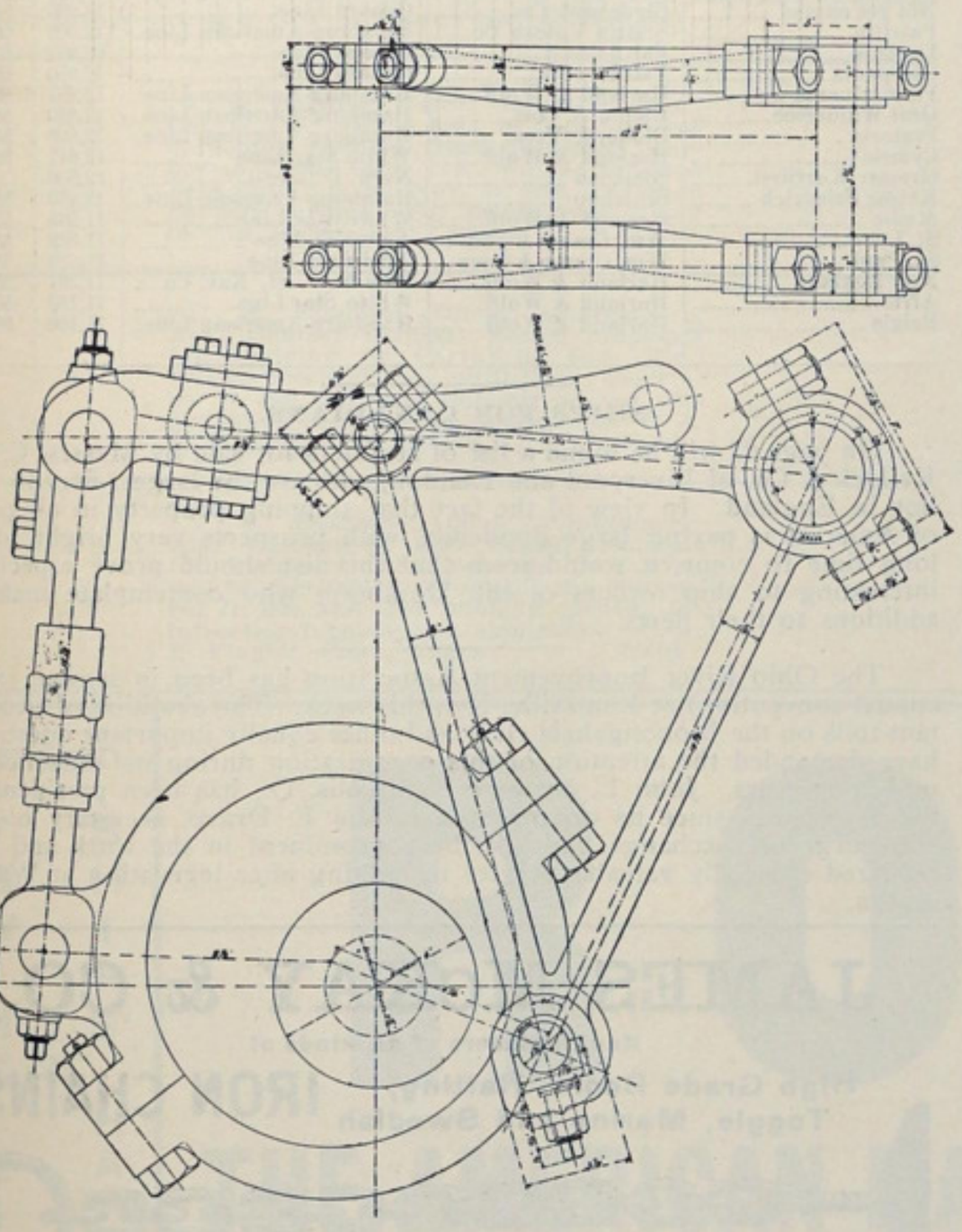


FIG. 2—EXPLANATORY DIAGRAMS—FIG. 3.

10 to 11 as the long end, and from 10 to the center of link block as the short end of a lever. The two levers described constitute a system of compound leverage, which allows unbalanced valves to be handled with ease, and brings a large percentage of the whole wear to the main fulcrum pin 6, where it is easy to provide ample bearings as well as adjustability for wear.

As shown in Fig. 1, the link block is in position for cutting of steam at three-quarters of the stroke (in this case the full gear position), from which it will be apparent that a much shorter link is employed than ordinarily. In an engine of 42 inches stroke the link need not be longer than from 18 to 20 inches between the center of the block in full gear ahead and the like point backing, unless a later cut is desired than here supposed. The slip of the link block can be held within very narrow limits if proper care be given to the hanging of the bridle rod 15, as any slipping action comes from this source.

Fig. 2 shows positions occupied by the gear when crank pin is on either center. Full lines designate the same position as Fig. 1, while the dotted lines denote the opposite or lower center. It will be seen that in both these positions the mean tangent of the link falls at right angles to a, the center line of engine, hence the block may be swept through the link (whose radius is the valve stem) without altering the position of the valve. Lead is therefore constant. Pivot 11 is bent back on to the mean tangent line, in order to secure equalization of the angles said tangent takes with rod 12. In Fig. 2, 3-3 represents the eccentric strap and B the path of eccentric center. In order to insure the link falling square



LANG SYSTEM OF VALVE GEAR.

with center line a at dead center points, the displacement of pivot 5, either side of line c, must equal the displacement of pivot 10, either side of line D, at these periods of the stroke. Reference to Fig. 1 will show that the eccentric is advanced somewhat beyond pivot 4, which is necessary, not only to secure an equalized motion of frames, whether engine move ahead or astern, but also to bring pivot 5 to its correct place, or to give it a displacement equal to that of 10. There are a number of abstruse points involved in this connection, which embrace the correct location of main fulcrum 6, but these could not be made clear without more elaboration than space will permit. Suffice to say that the fulcrum pin 6 will usually be located at from five to six times the eccentricity above, and from four to four and one-half times the eccentricity to one side of center of main shaft. The fulcrum pin may, if desired, be located on opposite (or starboard) side of engine from that shown in Fig. 1, in which case the free end of link would constitute the reverse or backing end.

In Fig. 2, when crank pin reaches lower center, 4 will have moved to 4′ 5 to 5′, 11 to 11′, and 10 to 10′.

Fig. 3 illustrates how the quick movement and long dwell of valve is obtained, the full lines designating position after crank pin has moved from center line a to 17′, the crosshead having then acquired one inch of its stroke. Pivot 4 has now been displaced by a very small distance, while 10 has moved almost imperceptibly; the latter may therefore be regarded as a fixed point during this interval of the stroke; 5 has now moved from position designated by full lines, Fig. 2, to 5′, Fig. 3, and has, of course, displaced pivot 11 by a like amount, which results in a quick switching motion of the link and consequent large and rapid displacement of the block 14. We will now suppose the crank pin to have moved from 17′ to 17^2, equaling crosshead displacement of 21 inches, or one-half the stroke. We now find pivot 5 at 5^2, and 11 at 11^2, but during this period link block 14 has only received a slight further displacement or to 14′, the reason being that 4 will now be found at 4^2, and 10 at 10^2, or at their mid travel, from which it will be plain that after the first inch of stroke is attained little further displacement is given the link block, as the impulse transmitted to it from pivot 5 is counteracted by the upward movement of 10, thus producing a long dwell of the valve. The same movement occurs during the up stroke and is equally apparant whether the engine be running ahead or astern.

The design of the gear must be such that when the crosshead reaches 21 inches or half stroke, pivot 10 will be exactly at its mid travel. If this be adhered to, all error due to angularity of the connecting rod will be eliminated. Fortunately the system lends itself easily to such design, which will be better understood when it is stated that one of the prime factors in laying it down is the length of the connecting rod. The length supposed in Figs. 1, 2 and 3 is 8 feet.

If we suppose the link block hooked up to cut off at 10½ inches, or one-quarter of stroke—lead being 3-16 inch—we would find an effective port opening of from 7-16 to 9-16 inch, according to design. A little study of the action as illustrated in Fig. 3 will make this apparent. The single eccentric used to operate the system is keyed on main shaft directly in line with the valve stem, and the longitudinal space taken up will be less than that occupied where two eccentrics are used; hence it offers no obstruction to getting at the main bearings. The link working down near the main shaft admits of free access to the crosshead guides at all times. It may be said that the action of this gear admits of the use of narrower ports than ordinarily, so that engines specially designed for it may have a very small percentage of clearance.

The peculiarities of the system adapt it admirably to drive a Corliss wrist plate with separate admission and exhaust valves, all being driven directly by the same plate, the drop cut and dash pot features being left out, thus admitting of a short stroke, high piston speed, four-valve engine. The admission of steam with such an arrangement will be much faster than with the ordinary Corliss system, while the cut off will be nearly as fast, the engine, of course, having the advantage of reversibility. The throw of the wrist plate would be variable under the influence of reverse lever or governor, but this is hardly a disadvantage when the wide port opening attainable at very short cuts is considered. The advantages to be gained by the use of separate admission and exhaust valves is too well known to need enlargement here. A marine engine so designed need not have over 5 percent clearance, while the construction admits of a shorter bed plate than ordinarily.

Mr. D. E. Ford, general manager of the Superior Ship Building Co., was the first to practically recognize the advantages to be derived from the system of valve gearing described herewith, and through him and his assistants the inventor has been enabled to bring it before the engineering public in practicable shape. To Capt. Alex McDougall the inventor is also indebted.

ITEMS OF INTEREST.

It is officially announced that the Welland canal will be open Sundays until the close of navigation.

The American Ship Building Co. (consolidated ship yards of the great lakes) has just paid another quarterly dividend of 1¾ per cent on preferred stock.

Frank B. King, marine engineer and consulting naval architect of Washington, D. C., has prepared plans of a 100-foot steel harbor tug for the Standard Oil Co.

The steamer Hartford, recently completed by the Columbian Iron Works, Baltimore, for the New York & Hartford Transportation Co., was given a builder's trial a few days ago. Among those on board were Mayor Malster of Baltimore, president of the Columbian Iron Works, Mr. Konitzky, superintendent, and Charles Boulden, secretary to the president. The trial was highly successful.

The experimental tank at Washington is already beginning to prove its worth. The model of the Denver class of cruisers has been towed, and allowing for a propulsive co-efficient of about .54, which is rather low, it has been found that the designed power of 4,500 will give the vessels a speed of 16¾ knots. As 16½ knots is the designed speed, the builders will have a good quarter-knot margin, and as the propulsive co-efficient will probably approach .58 or .59, the margin of power will be still greater.

A press dispatch from Washington states that the bureau of navigation has prepared a statement from the latest available reports showing an annual expenditure of $26,063,688 by foreign nations on their merchant shipping. The United States, it is shown, paid to American vessels for ocean mails $1,038,141 for the fiscal year ended June 30, 1898. The items are as follows: Great Britain, total $5,762,572; Germany, total $1,894,620; France, $7,632,242; Italy, $2,185,266; Russia, $1,168,187; Austria-Hungary, $1,724,249; Spain, $1,629,927; Portugal, $63,300; Netherlands, $259,000; Norway, $136,948; Sweden, $31,844.

The Dismal Swamp canal was opened to navigation last week. It extends from Deep creek near Norfolk, Va., to Pasquotank river, North Carolina, being 22 miles long, 10 feet deep and 80 feet in width. This waterway, which was originally surveyed by George Washington and has just been completed at a cost of nearly $1,000,000, is designed to allow small vessels of all kinds to go south by means of an inland route, thus avoiding the Diamond shoals and the dangers of rounding Hatteras. There are only two locks, one at either end. The torpedo boat Talbot, which was recently fitted for the use of oil fuel, was one of the first vessels to pass through the canal.

Great preparations are being made at Richmond, Va., for the big public celebration that is to mark the launching, the latter part of the month, of the torpedo boat Shubrick, the initial vessel built at the recently established yard of the William R. Trigg Co. The vessel will be launched sideways, in conformity to the method in use in the ship yards of the great lakes. The plan was adopted both by reason of the narrowness of the slip into which the boat will be launched and also to save space in the ship yard. Just before launching, the boat, which now rests on keel blocks, will be placed on athwartship cradles, eight in number. Work on the other torpedo boats building at the Trigg yard is well under way.

TRADE NOTES.

Abram Smith & Son of Algonac, Mich., have dredged the slips in their ship yard so that they now have 17 feet of water.

A general line of crane work will be a specialty with the International Engineering Works of Detroit, which succeeds the old Frontier Iron Works. The new company already has considerable work in hand, including a crane for the machine shop that is being erected at Toledo by the Craig Ship Building Co.

Thos. Drein & Son of Wilmington, Del., report the following orders in hand Oct. 15: Twenty-six 24-foot patent beaded, galvanized steel-bottom life boats for southern vessels; thirty-five large sea life rafts; twenty 26-foot patent beaded steel life boats for ocean steamships; two 24-foot patent beaded steel life boats for the Union Dry Dock Co. of Buffalo; four 26-foot wooden boats for government service; six 22-foot steel life boats for eastern steamers; four life rafts and ten steel life boats for tugs.

Thomas H. Dallett & Co. of No. 2300 West York street, Philadelphia, make a portable electric deck planer that is meeting with favor in all ship yards. Full particulars of the machine will be furnished upon application to the manufacturers. A small illustration and brief description of it will be found in an advertisement on page 25. It has the appearance at first glance of a lawn mower. This machine, the manufacturers claim, will do the work of ten men and will do it better than the men can do it. The depth of cut can be instantly changed. The motor is dust and water proof.

An acetylene generator which is said to be thoroughly reliable has been placed upon the market by the Auto-Acetylene Co., 13-21 Park Row, New York, and it is claimed that this company has not only established a large works at Greenpoint avenue and Pavost street, Brooklyn, but has also provided manufacturing facilities at Boulogne-sur-Seine, Paris, to supply a demand for their apparatus on the European continent. The company's headquarters in Europe is 27 Rue de Richelieu, Paris. In a paragraph descriptive of their machines, this company says: "Auto-generators are made from the best materials throughout and are subjected to a thorough test before they leave the factory. They are provided with two or more carbide chambers to each generator and a condenser purifier, which cools, dries and purifies the gas. The water deal attachment and safety gauge are entirely automatic, and a uniform pressure best suited for the gas is constantly maintained. The whole apparatus is self-contained, requires no attention, and cannot get out of order. When once the proper pressure of gas is determined, the regulator is set for that pressure, and it cannot vary. The gasometer is correctly proportioned to the capacity best suited for the average flow of gas, and is given the greatest free range of movement. We are prepared to furnish generators of 5 to 3,000 lights capacity."

THE WORLD'S LARGEST STEAMERS.

The launching at the yard of Swan & Hunter at Wallsend-on-Tyne, England, a short time ago, of the Cunard liner Ivernia, the fourth largest steamer in the world, has brought about a revision of comparisons heretofore made between the largest vessels afloat. Of the twenty steamers of more than 11,000 tons register, nine are British, nine German and two American. Of the German boats, two are the product of Harland & Wolff's yard, so that of the twenty vessels, eleven were built in Great Britain or Ireland, two in the United States and seven in Germany. If, however, the vessels of from 10,000 to 11,000 tons are taken into consideration it becomes readily apparent how serious is the competition which Germany is offering to Great Britain. Of this class of steamer German owners have in commission or building a total of ten, while Great Britain has but one, and Holland one. The twenty steamers of more than 11,000 tons gross register each, range according to their size as follows:

Names.	Builders.	Owners.	Gross tonnage.	Length between perpendiculars, feet.
Oceanic	Harland & Wolff	White Star Line	17,274	685.7
Deutschland	Stettin Vulcan Co.	Hamburg-American Line	15,500	.....
Kaiser Wilhelm der Grosse	Stettin Vulcan Co.	Nord. D. Lloyd	14,349	637.4
Ivernia	Swan & Hunter	Cunard Line	13,900	580
Not yet named	Clydebank Co.	Cunard Line	13,900	580
Patritia	Stettin Vulcan Co.	Hamburg-American Line	13,000	560
Lucania	Fairfield Co.	Cunard Line	12,952	601
Campania	Fairfield Co.	Cunard Line	12,950	601
Pennsylvania	Harland & Wolff	Hamburg-American Line	12,891	560
Graf Waldersee	Blohm & Voss	Hamburg-American Line	12,830	560
Pretoria	Blohm & Voss	Hamburg-American Line	12,800	560
Cymric	Harland & Wolff	White Star Line	12,647	585.5
Grosser Kurfürst	Schichau	Nord. D. Lloyd	12,500	.....
Kaiser Friedrich	Schichau	Hamburg-American Line	12,480	581.5
Medic	Harland & Wolff	White Star Line	11,985	550.2
St. Louis	Wm. Cramp & Sons	American Line	11,629	535.5
St. Paul	Wm. Cramp & Sons	American Line	11,629	535.5
New England	Harland & Wolff	B. & N. A. St. Nav. Co.	11,394	550.3
Afric	Harland & Wolff	White Star Line	11,183	550.2
Belgia	Harland & Wolff	Hamburg-American Line	11,100	500.3

SHIPS FOR CANADIANS.

On page 22 will be found a list of steamers for sale by Messrs. C. W. Kellock & Co. of Liverpool and London, who are the largest firm in this line in England. In view of the fact that shipping property in all parts of America is paying large dividends, with prospects very bright for a long time to come, it would seem that this list should prove especially interesting to ship owners of the Dominion who contemplate making additions to their fleets.

The Ohio River Improvement Association has been in session (fifth annual convention) at Louisville, Ky., this week. The abolition of exorbitant tolls on the Monongahela river and other equally important questions have demanded the attention of this organization during its existence of only four years. John L. Vance of Gallipolis, O., has been president of the association since its organization. John F. Dravo, secretary of the Pittsburg coal exchange, has also been prominent in the work and has rendered especially valuable service in looking after legislation at Washington.

MERCHANT & CO.'S PHILADELPHIA EXHIBIT.

Merchant & Co., Inc., of Philadelphia, New York, Brooklyn and Chicago, extend a cordial invitation to everyone interested in their line of goods to pay a visit to their exhibit at the National Export Exposition now on at Philadelphia—section D-6, main building. This company will have representatives there at all times who will be glad to see all visitors and give them information about the goods they have to offer. The exhibit itself is a novel one, consisting of a handsome booth, covered with the well-known Merchants Spanish tiles, and having two "Star" ventilators, one of the standard form and the other of the glass-top skylight form. Above this roof there is an apparatus which distributes water in the shape of rain, so that the visitor has a practical example of the value of good roofing as a protection against the weather. Within the booth is a full line of the product of the company's smelting works, consisting of the largest line of Babbitt metals produced in America, as well as every description of solder and newspaper metals; also a full sample line of Merchant's high grade roofing and bright tin plates, metal ceiling, etc., as well as brass tubing, which they handle in very large quantities.

Contracts have been awarded for a portion of the machinery for the new dry dock at the Boston navy yard. The Prindle Pump Co. of New York has been given an order for three centrifugal pumps of a capacity of 35,000 gallons per minute each and for engines of 600 horse power, as well as boilers of 2,000 horse power. The contract for three direct-current generators and three motors goes to the Westinghouse Electric Manufacturing Co. at a cost of approximately $140,000.

U. S. Engineer Office, Galveston, Tex., Oct. 16, 1899. Sealed bids, in triplicate, for deepening channel from Galveston Harbor to Texas City, Tex., will be received here until 2 p. m. Nov. 15, 1899, and then publicly opened. For information apply to C. S. Riche, Capt., Engrs. Nov9

U. S. Engineer Office, Montgomery, Ala., October 11, 1899. Sealed proposals for dredging on Carrabelle Bar, Fla., will be received here until 12 m., November 14, 1899, and then publicly opened. Information furnished on application. C. A. F. Flagler, Capt., Engrs. Nov9

U. S. Engineer Office, Montgomery, Ala., October 11, 1899. Sealed proposals for dredging in Apalachicola Bay, Fla., will be received here until 12 m., November 14, 1899, and then publicly opened. Information furnished on application. C. A. F. Flagler, Capt., Engrs. Nov9

VALUE OF STOCKS—LEADING IRON AND STEEL INDUSTRIALS.

Quotations furnished by HERBERT WRIGHT & Co., Cleveland, date of Oct. 18, 1899.

NAME OF STOCK.	OPEN	HIGH	LOW	CLOSE
American Steel & Wire.....	50¼	52⅛	50¼	51½
American Steel & Wire, Pfd.....	96	96	96	96
Federal Steel	53	54¼	53	54¼
Federal Steel, Pfd.....	77	78	76¾	78
National Steel	50	50½	49⅝	50
National Steel, Pfd*.....	95	95	95	95
American Tin Plate	37	37½	37	37
American Tin Plate, Pfd.....	85½	85½	85½	85½
American Steel Hoop.....	42	43	42	42⅞
American Steel Hoop, Pfd.....	84½	85	84½	85
Republic Iron & Steel	26½	27¼	26½	26½
Republic Iron & Steel, Pfd	70½	71	70¼	70½

* Ex. Dividend, 1¾ per cent.

VANDUZEN'S STEAM JET PUMPS.

It is impossible to describe all the uses to which these steam-jet pumps are adapted. They are sold all over the wide world and are pumping over thirty different kinds of liquids. They will not pump heavy oils or grease. They make first-class fire pumps, being absolutely reliable and certain to start work as soon as steam is turned on. For full particulars send for catalogue No. 82 to the E. W. Van Duzen Co., Cincinnati, O.

U. S. Engineer Office, Milwaukee, Wis. Sept. 20, 1899. Sealed proposals for building Crib Breakwater at Sheboygan Harbor, Wis., will be received here until 12 o'clock noon, standard time. Oct. 24, 1899, and then publicly opened. Information furnished on application. J. G. Warren, Capt., Engrs. Oct. 19.

U. S. Engineer Office, Galveston, Tex. Sept. 25, 1899. Sealed bids, in triplicate, for Improving Aransas Pass, Tex., by removing old jetty and dredging, will be received until 2 p.m. Oct. 25, 1899, and then publicly opened. For information apply to C. S. Riche, Capt., Engrs. Oct. 19.

U. S. ENGINEER OFFICE, Montgomery, Ala., October 2nd, 1899. Sealed proposals for building two dipper dredges will be received here until 12:00 M., November 3rd, 1899, and then publicly opened. Information furnished on application to C. A. F. FLAGLER, Capt., Engineers. Oct. 26

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